The Foundrymen's Own Magazine

American Foundryman

NOVEMBER 1954

Duplexing in this Lectromelt Furnace gives castings specified wear, heat and pressure resistance.

"Specials are routine . . . with our *Lectromelt** Furnace"

"Special irons for special castings are routine production in our plant," says one gray iron foundry plant engineer. "The electric furnace process is the only way to produce irons that will meet the tensile strength and machinability requirements that our customers need in special castings," his chief metallurgist added.

The furnace being talked about was a Lectromelt. And the results are typical of the precise control Lectromelt Furnaces make possible. Whether you're working with irons, semi-steels or alloy steels, a Lectromelt Furnace will give you precise control at costs often comparable to cupola melting . . . yet, with unmatched flexibility.

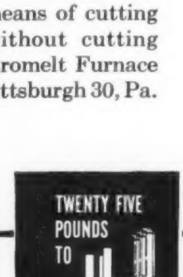
Laborsaving, top-charging Lectromelt Furnaces provide such control at low cost whether for melting, smelting, refining or reduction. Our engineers will gladly discuss means of cutting costs for these operations without cutting quality. Write, Pittsburgh Lectromelt Furnace Corporation, 316 32nd Street, Pittsburgh 30, Pa.

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*



For more data, circle No. 693 on postage-free Reader Service card, p. 17 or 18

FEDERAL ADDITIVES FOR BETTER SAND PREPARATION

(May be used as dry additives or in slurry)

Here's a striking verification of the truth in the old saying that "good things come in threes." For here are three sand additives that really are good! Additives that produce the exact sand characteristics necessary for good, dependable sand preparation.

You can vary the amount of Federal's GREEN BOND Bentonite added to your sand (*Pulverized or GB100 Granular for dry additives — #1200 Slurry Grade Granular for slurry use*) to provide the correct green and dry strengths for each type of work. Federal's CROWN HILL Seacoal gives the desired carbon content. And the addition of Federal SAND STABILIZER creates better flowability, regardless of compression strength—thus making for more uniform, faster ramming. It also provides a wider range of *safe* moisture content and better shakeout—permitting maximum sand reclamation. Federal's "three" really do an outstanding job of promoting better and easier sand control—economically!

And if this isn't enough to convince you—just consider that these three additives will cost you *less than $1.00 per ton of castings produced!* A new bulletin tells all about Federal's "three good things." Write for your copy today!

IMPORTANT
FOR SLURRY USERS!

If you use the slurry system of sand bonding, you'll want to learn about Federal's #1200 Slurry Grade, Granulated Green Bond Bentonite . . . and how it's used with Crown Hill Seacoal and Federal Sand Stabilizer to make the perfect slurry. We'll gladly consult with you or send complete information.

FEDERAL

Make your foundry a better place in which to work!

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

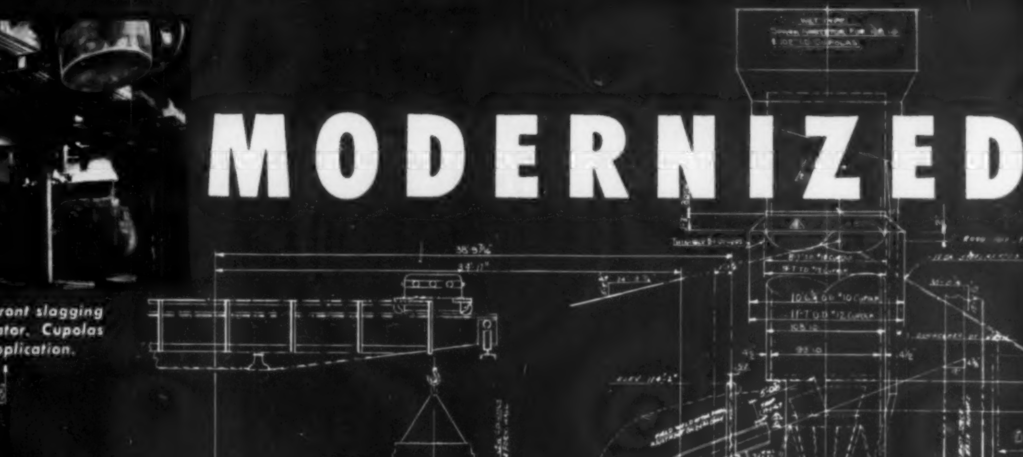
CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND, VA. • ST. LOUIS • CHATTANOOGA • NEW YORK • UPTON, WYO.

MODERNIZED

Four, MODERN cupolas with front slagging system and stock-line indicator. Cupolas are designed for hot blast application.

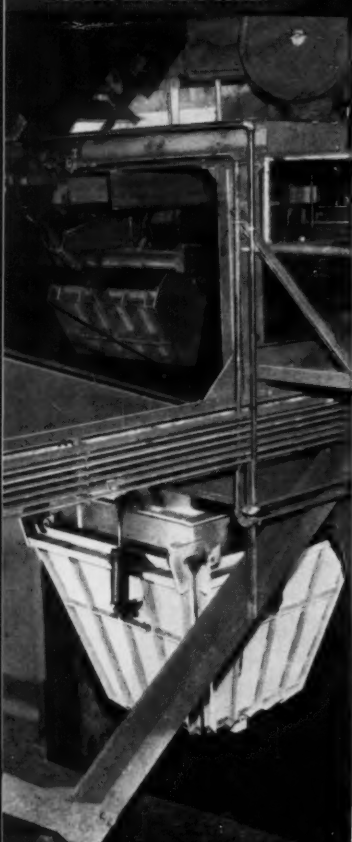
Vibratory feeder with grizzly section eliminates breeze and fines. Fines are belt conveyed to disposal bin.

Coke and stone weigh-hopper, mounted into the scale, charges the MODERN small-cone bucket.



Elevation drawing to indicate the location of equipment inside the foundry and relation of charger to the yard crane.

Iron is charged by MODERN magnet crane.



CONSULTING...ENGINEERING...MANUFACTURING...ERECTION

From start-to-finish this 100%, MODERN installation is helping to control automobile costs for one of America's foremost builders*. Here under one roof the new, MODERN-ENGINEERED charging and melting system is producing the gray iron for less and faster, too:

- All charging operations are controlled by two men . . .
- Conveying the coke and stone from bins to coke and stone weigh-hopper, weighing and recording are done automatically . . .
- MODERN stock-line indicator maintains the charge-level at its maximun, melting efficiency . . .
- Swivel charger serves two cupolas at one charger-cost . . .
- MODERN-HYDRO-WASH — flushing away of ash and slag from stacks and spouts to the settling tanks — reduces disposal costs . . .

In every way it pays to ask about the single responsibility which MODERN has proved to be more profitable and most satisfactory for all foundries both large and small . . .

*Nash Motors Division, American Motors

MODERN

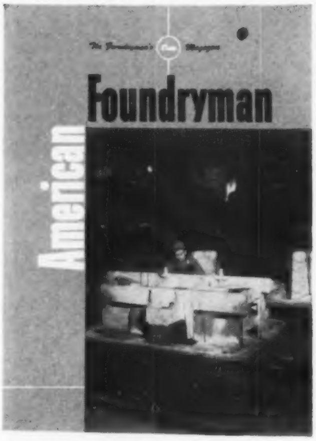
MODERN EQUIPMENT COMPANY
Department AF-11 Port Washington, Wisconsin

REPRESENTATIVES IN ALL PRINCIPAL CITIES

American Foundryman

Volume 26 *November 1954* *Number 5*

Published by American Foundrymen's Society



Floor inspector uses fixture to check core alignment and cavity dimensions of motor housing mold, a common step in production of quality steel castings of type covered by new SFSA "Recommended Minimum Standard" (pages 65-66, this issue). Photo courtesy of Steel Founders' Society of America.

In This Issue . . .

Departments . . .

AFS Headquarters

Golf & Wolf Roads
Des Plaines, Ill.
VAnderbilt 4-0181

Wm. W. Maloney
General Manager

American Foundryman

H. F. Scobie, *Editor*
J. M. Eckert, *Advertising Manager*
G. J. Minogue, *Production*

Contributing Editors

H. J. Heine, *Technical*
W. N. Davis, *Safety & Hygiene & Air Pollution Control*
A. B. Sinnett, *Education*

Advertising Representatives

Midwestern—Dwight Early & Sons
100 N. LaSalle St., Chicago
CEntral 6-2184

Eastern—Weston and Weston
6 E. 39th St., New York
Murray Hill 5-9450

Published monthly by the American Foundrymen's Society, Inc., Golf & Wolf Roads, Des Plaines, Ill. Subscription price in the U.S., Canada and Mexico $3.00 per year; elsewhere, $6.00. Single Copies 50c. May and June issues $1.00. Entered as Second Class Matter under Act of March 3, 1879, at the Post Office, Des Plaines, Ill. Additional entry at Chicago.

 For more data, circle No. 645 on postage-free Reader Service card, p. 17 or 18

THE MOLDING SAND FOR UP TO 50 FLOORS is thoroughly prepared daily by this Nite Gang at the G & C Foundry. Shakeout sand heaped on the floors is thoroughly blended and then elevated and discharged over a magnetic separator. The scrap-free sand is then aerated, screened, aerated again and discharged into a pile or windrow ready for use. The machine is self-loading and self-propelling. *For full details, write Beardsley & Piper, 2424 N. Cicero Ave., Chicago.*

MOLDS FOR A LARGE NUMBER of different castings are produced efficiently by this Tractor Sandslinger at the Forest City Foundries. Cope and drag patterns are mounted on two portable pin-lift machines towed behind the slinger as it moves into the sand heap. Patterns are easily changed, and production from varied patterns is high. Effective mechanization has been attained at very low cost. *For full information write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago.*

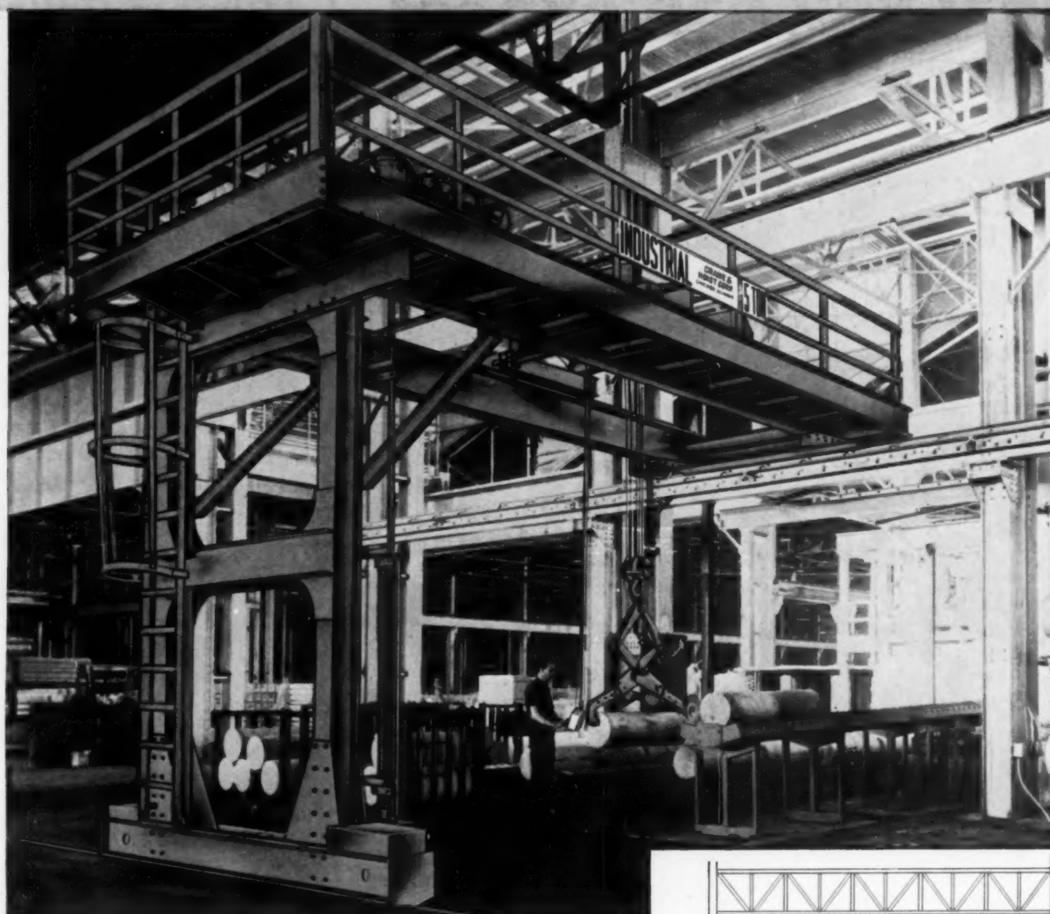
EXACT LABORATORY CONTROL of sand preparation requires laboratory mulling equipment that will do a thorough job of developing full sand physical properties in minimum time. The compact Lab Mulbaro is designed for fast complete mulling. Mulling bowls are removable to simplify laboratory procedures. *Beardsley & Piper, 2424 N. Cicero Ave., Chicago.*

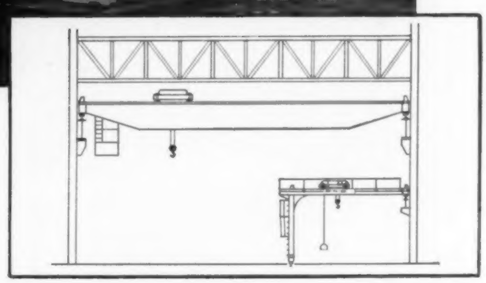
THE MEECH FOUNDRY is small and space for molding is at a premium. Headroom is only 12′ and the molding bay is less than 30′ wide. Yet, Meech is getting the full benefits of slinger mechanization with a Motive Sandslinger which rams all of their molds except for squeezer work. *More information may be obtained by writing to Beardsley & Piper, 2424 N. Cicero Ave., Chicago.*

For more data, circle No. 645 on postage-free Reader Service card, p. 17 or 18

For more data, circle No. 647 on postage-free Reader Service card, p. 17-18

Industrial SEMI-GANTRYS SPEED BILLET HANDLING





An Industrial motorized Semi-Gantry does a production job handling billets from racks to a conveyor in a large metal plant.

Serving a local area in the factory the Industrial Semi-Gantry operates on its own runway—freeing the heavy capacity overhead crane for other important jobs, resulting in overall savings in operation and maintenance.

Consult with Industrial Crane & Hoist Corporation for an economical solution to your materials handling problems.

The diagram illustrates the relative positions of the Industrial Semi-Gantry and the heavy capacity overhead crane, both of which operate without interfering with each other.

Industrial CRANES ®

INDUSTRIAL CRANE & HOIST CORPORATION

1505 SOUTH PAULINA STREET CHICAGO 8, ILLINOIS

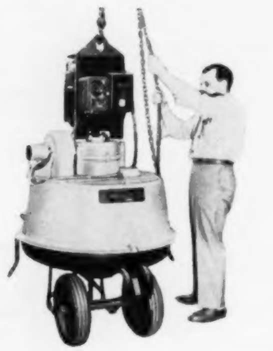
Overhead Cranes • Jib Cranes • Monorail Systems • Crane Runways
Representatives in Principal Cities

SG 1054 C

For more data, circle No. 649 on postage-free Reader Service card, p. 17 or 18

Products & Processes

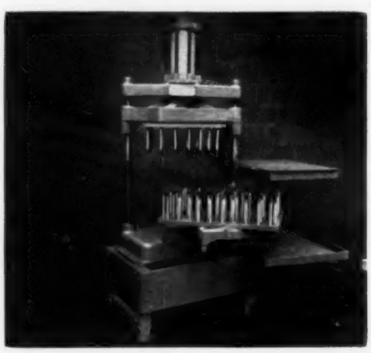
Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20



▲ Shell Mulbaro

New Shell Mulbaro brings thorough preparation of coated resin sand mixes within reach of the most modest equipment budgets. Unit is designed to fully prepare coated resin sand mixes using either the wet or dry mixing process. Especially low cost of processing will increase savings made by reduced resin consumption, it is claimed. Coated mixes require up to 50 per cent less resin for comparable strength and may be stored and used without deterioration. *Beardsley & Piper, Div. Pettibone Mulliken Corp.*

For more data, circle No. 596 on p. 17



▲ Bonding Fixture

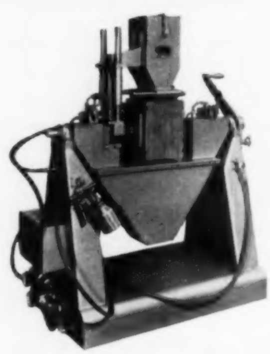
New large-size shell bonding fixture handles any size shell mold up to 20 x 30 in. Molds which project as high as 8 in. in both cope and drag can be handled with the standard pressure pin assemblies supplied with the machine. There are 1955 holes in each platen, both top and bottom, which permit an infinite number of pressure pattern groupings. This permits a quick changeover from one job to the next, without costly down-time. A timer automatically controls the pressure cycle. *Shell Process, Inc.*

For more data, circle No. 597 on p. 17

▼ Shell Cores

The first commercially available machine to produce shell cores for use with green sand, permanent, and shell molds, has been announced. It is said to deliver a completely cured shell core every 30 to 50 seconds. With multiple cavity boxes, production is proportionately higher. Available for either gravity investment, with sand hopper and shutter, or for blown cores, with a blow head, the Shalcoe Shell Core Machine can be used with most existing core boxes. *Shalco Engineering Corp.*

For more data, circle No. 598 on p. 17



▼ Hook Scale

The Martin-Decker SU-20 Sensater is a hydraulically operated hook scale that has a guaranteed accuracy of ¼ of 1 per cent of capacity at any point on the dial. Accuracy was made possible through the discovery and development of a new kind of mobile diaphragm that develops a piston-like stroke—but without a friction-causing piston rod or packing. The diaphragm does not deflect, but moves with its backing plate, transmitting a constantly accurate signal to the gauge. *Martin-Decker Corp.*

For more data, circle No. 599 on p. 17

▲ Contact Wheel

New contact wheel, TF-54, combining aggressiveness with softness and conformability, has been developed for coated abrasive belt polishing and finishing. It is made of a new red rubber compound—abrasive and oil resistant—offering for the first time a high-tensile 20 durometer wheel which can safely be run at speeds up to 10000 surface fpm. Wheel's ability to conform to contoured surfaces means fewer passes to polish a contour, without harsh cuts, grabbing and strikes. *Chicago Rubber Co.*

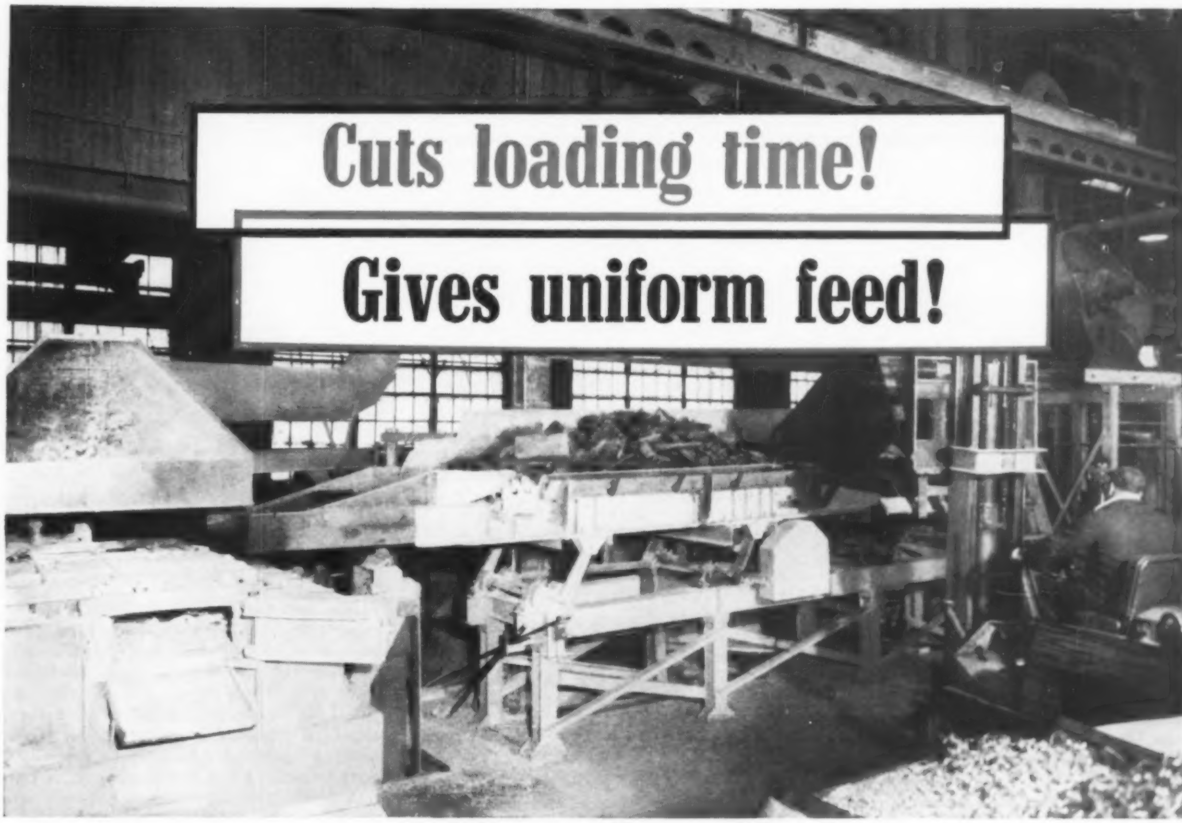
For more data, circle No. 600 on p. 17

▲ Fire Repellent Fabrics

New fire repellent fabric so constructed that it offers certified protection against raging flames and high radiant heat temperatures up to 2500° F has been announced. Fabric, which can be made into suiting and protective equipment has been devised by a patented process that fuses flame resistant fabrics to metallic layers and then topped by specially treated aluminum foil. Fyre-Armor suits, which come in ten models, weigh only as much as an ordinary suit or coat, offering ease of movement. *Far-Ex Corp.*

For more data, circle No. 601 on p. 17

continued on page 12



Placing lightweight shavings and chips near discharge end provides a cushion that protects the furnace lining from heavier scrap.

LINK-BELT Oscillating Conveyor proves highly effective charging induction furnace at New England foundry

By installing a Link-Belt Oscillating Conveyor to charge their large capacity electric induction melting furnace, this New England non-ferrous foundry achieved two important advantages:

(1) An entire furnace batch ($2\frac{1}{2}$ tons) of brass mill scrap, chips and shavings can be loaded on the conveyor at one time—freeing the operator for other duties.

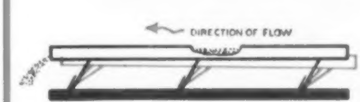
(2) Positive Action (see box) smooths concentrated loads to a uniform, continuous flow at the furnace.

Over a thousand Link-Belt Oscillating Conveyors are operating successfully in foundries. They find additional use separating sand and castings when the feed end section has a perforated plate bottom that acts as a shakeout.

Remember, too, you can now save time and money because 36 in. wide sections are carried in stock. These pre-engineered sections can be built up to any desired length.

Whether you need a single machine or a complete sand and castings handling system—call on Link-Belt. Our engineers will work with you and your consultants—help you get the finest in mechanized facilities.

How Positive Action moves materials



Positive-action, constant-stroke eccentric provides a powerful, yet gentle upward and forward oscillating motion. Large volumes of material are moved in a uniform, continuous flow, regardless of surges. Resonant spring action of resilient legs cuts power requirements to a minimum.

MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC.

13,552

LINK-BELT
THE SYMBOL OF QUALITY LB LINK-BELT

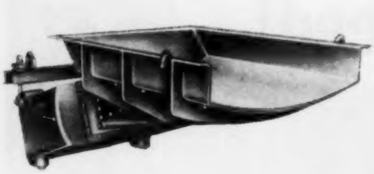
CONVEYORS AND PREPARATION EQUIPMENT

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Sydney; South Africa, Springs. Representatives Throughout the World.

Products & Processes

continued from page 10

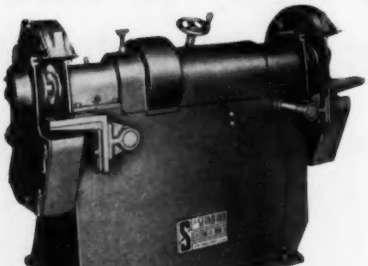
Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20



▲ Heavy Duty Feeder

New heavy tonnage Vibratory Feeder, identified as Model F-86, has been announced. Feeder, equipped with a 54 x 72 in. flat pan trough, has a maximum feeding capacity of 750 tons per hour of bulk materials. It utilizes the patented Syntron electromagnetic principle which eliminates such rotating parts as gears, belts, idlers, eccentrics, etc., and produces 3600 conveying vibrations per minute from 220 or 440 Volt, 60 cycle, A-C. Catalog data is available from the manufacturer. *Syntron Co.*

For more data, circle No. 602 on p. 17



▲ Snagging Grinder

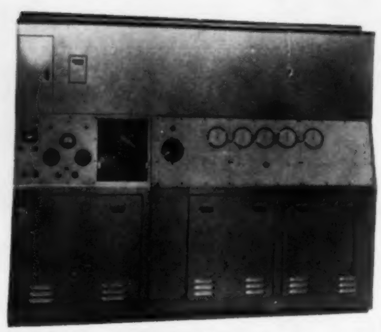
Type 10GVS Double End Infinitely Variable Speed Snagging Grinder is of rugged design and built according to the Safety Code of the American Standards and Foundrymen's Associations. Guards are of structural plate steel with adjustment to compensate for wheel wear. Each guard has stationary exhaust outlet. Quick wheel change is facilitated by quick-acting latches securing the hinged guard covers. No wrenches are needed. Equipment includes magnetic starter. *Standard Electrical Tool Co.*

For more data, circle No. 603 on p. 17

▼ Direct Reading Spectrometer

Atomcounter, a direct reading spectrometer, that incorporates many new electronic, optical and mechanical design innovations, has been announced. New instrument has a double optical system and focal deck so that it may be used photographically for qualitative or semi-quantitative analysis, simultaneously with or alternatively to the direct reading measurements. It is also furnished as a single deck direct reading system for use in the analysis of simple steels and cast iron. *Jarrell-Ash Co.*

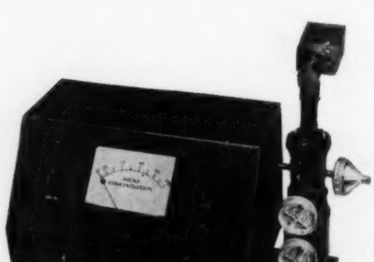
For more data, circle No. 604 on p. 17

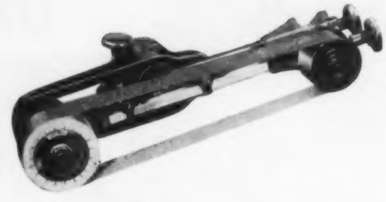


▼ Smoke Photometer

New Sinclair-Phoenix forward-scattering aerosol and smoke photometer has been announced. It is a rugged, portable unit designed for the study, measurement, and control of air pollution and particulate matter suspended in aerosols. It has numerous other applications such as a control and research tool for rapid evaluation in filter designs, testing efficiency of fans, air-wash systems, and air conditioners or for measurement of respiratory accumulation of dust and smoke particles. *Phoenix Precision Instrument Co.*

For more data, circle No. 605 on p. 17

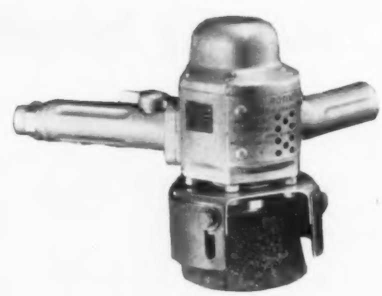




▲ Wheel Belt Grinder

Model 500 Contact Wheel Belt Grinder reportedly increases production 20 per cent over old grinding methods. It can be mounted on a bench, pillar, portable table or most any convenient place in the shop. An adjustment of 360 degrees vertically is part of its unique and original design. Instantly adjustable to the most advantageous point for visual and physical comfort of the operator. Speeds up production on deburring, chamfering, removing flash, fins, and parting lines. *B & E. Manufacturing Co.*

For more data, circle No. 606 on p. 17



▲ Vertical Grinder

New light weight vertical grinder for cup wheels, cut-off wheels, sanding pads and wire brushes has been announced. Weighing only 6¾ lb, the tool measures 5½ in. to top of spindle washer or an overall height, including spindle of 7 in. Speeds of 8000, 6000 and 4500 rpm are listed. Speed is controlled by quick acting governor threaded into rotor shaft. This feature eliminates rocker arm and simplifies maintenance. Automatic oiler and air strainer are built-in. *Rotor Tool Co.*

For more data, circle No. 607 on p. 17

continued on page 17

HOW TO PUT THE SQUEEZE ON BLAST CLEANING COSTS

. . . ***USE MALLEABRASIVE, SHOT OR GRIT.*** Scientifically heat-treated for durability, Malleabrasive lasts longer. Laboratory controlled for strength and consistency, Malleabrasive cleans better faster. And because it does a better job in less time with fewer refills, Malleabrasive cleans *cheaper!* See for yourself. Next time you order blast cleaning abrasive, specify Malleabrasive from Pangborn Corp., 1300 Pangborn Blvd., Hagerstown, Maryland.

Pangborn DISTRIBUTORS FOR

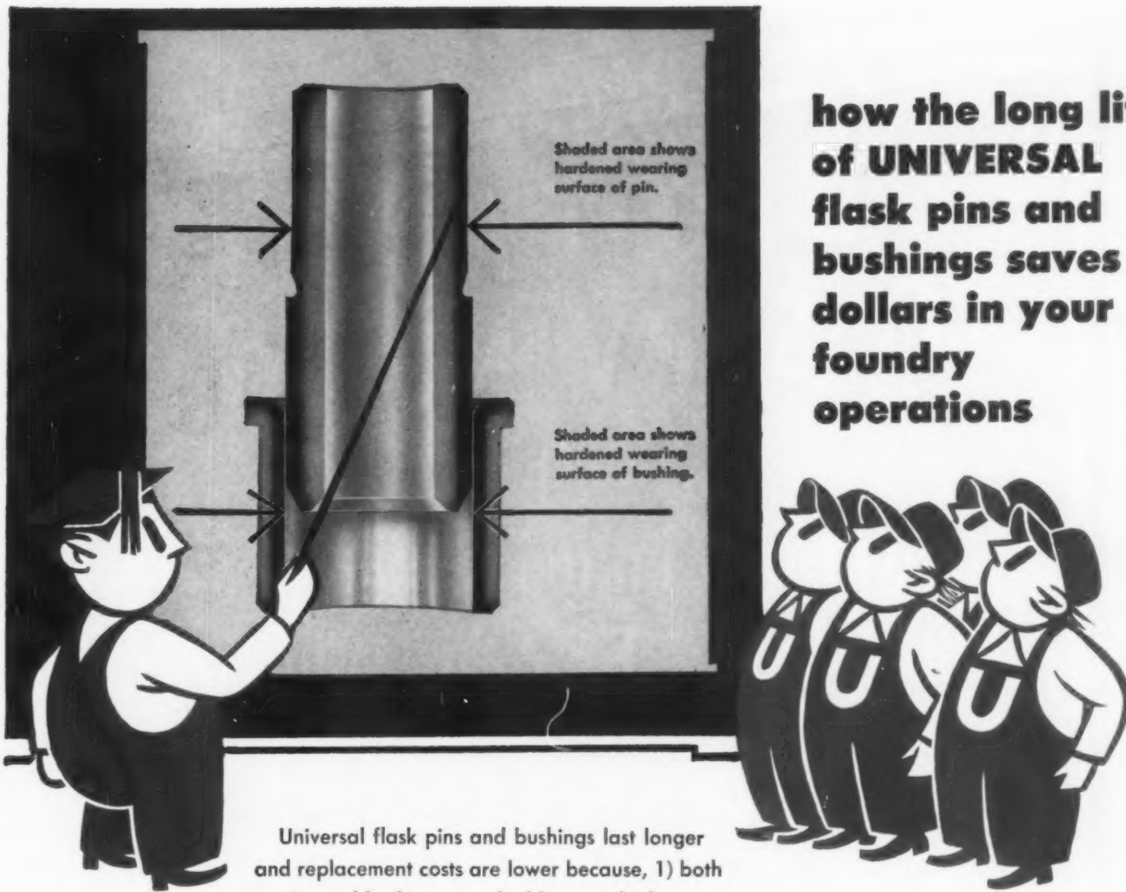
MALLEABRASIVE®

PANGBORN'S 50th ANNIVERSARY—1904-1954

U. S. Patent # 2184926
(other patents pending)

For more data, circle No. 652 on postage-free Reader Service card, p. 17 or 18

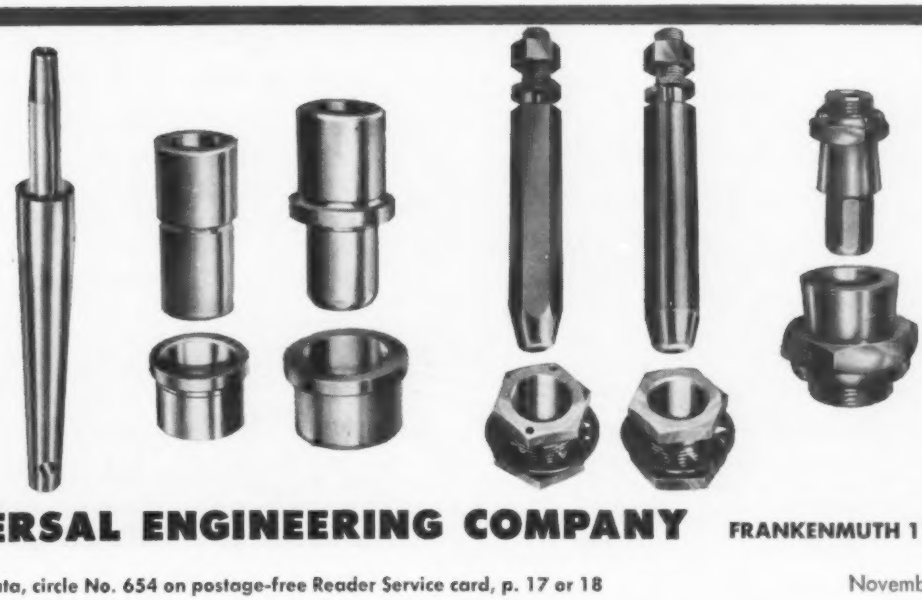
For more data, circle No. 653 on postage-free Reader Service card, p. 17 or 18



how the long life of UNIVERSAL flask pins and bushings saves dollars in your foundry operations

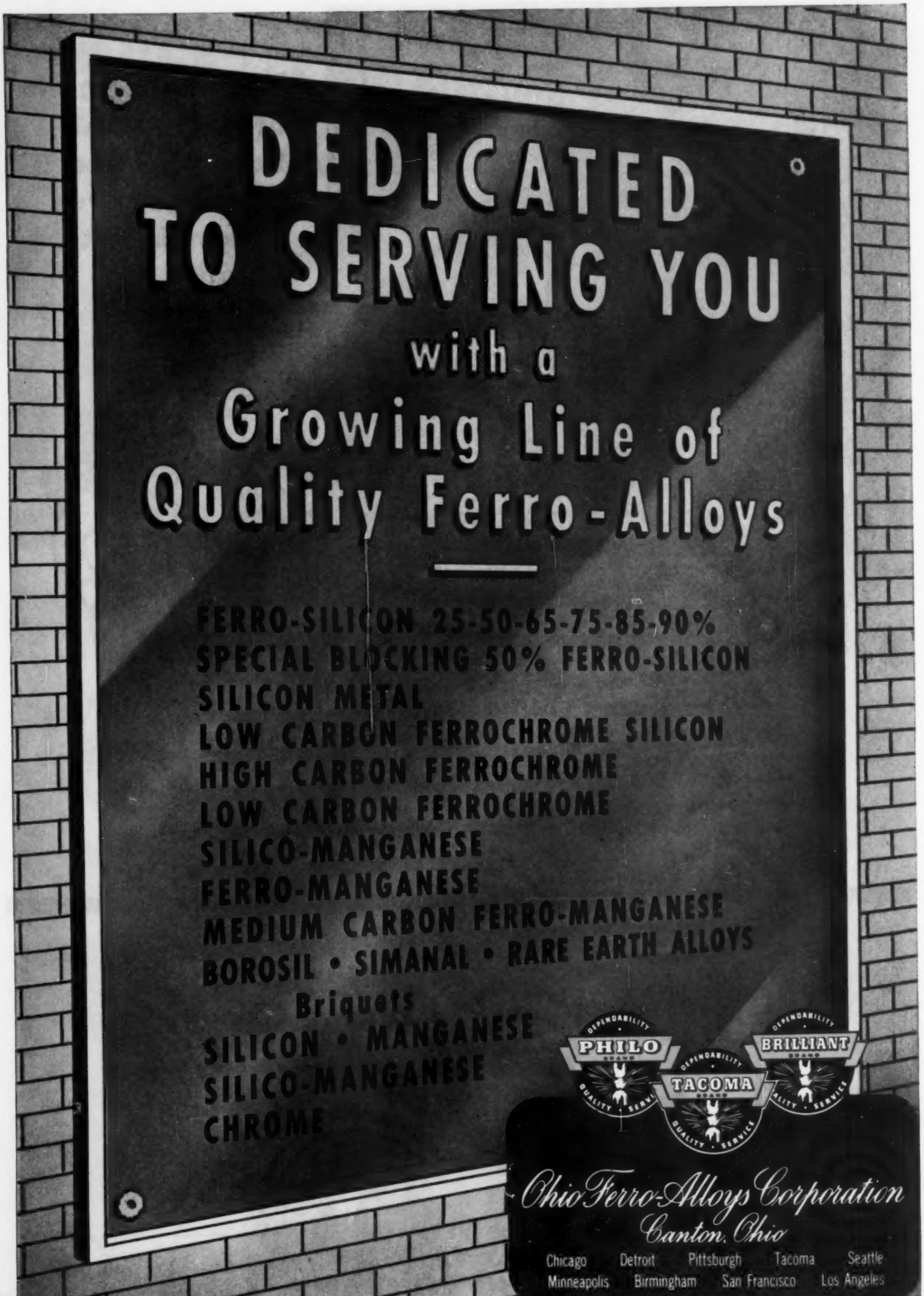
Universal flask pins and bushings last longer and replacement costs are lower because, 1) both pins and bushings are double quenched and double drawn to produce strong, ductile cores that can take rough treatment in the foundry without breaking or chipping and, 2) wearing surfaces are carburized and hardened to withstand wear. Universal flask pins and bushings are precision ground to insure instant, accurate alignment of cope and drag. For complete information, write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N.J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

185



UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 12, MICHIGAN

For more data, circle No. 654 on postage-free Reader Service card, p. 17 or 18



For more data, circle No. 655 on postage-free Reader Service card, p. 17-18

Products & Processes

continued from page 12

Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20

Deoxidizing Process

New method for packaging chemicals for taking oxygen out of molten copper, has been announced. Chemical-packed type is plunged into the crucible just before the copper is poured. It dissolves and the chemical reaction removes traces of oxygen. *Electro Refractories & Abrasives Corp.*

For more data, circle No. 608 on card

Hand Pyrometer

New illuminated dial feature is incorporated as an extra in the line of Xactemp Hand Pyrometers. It permits reading the pyrometer in poorly lighter areas without flashlight or auxiliary lighting. Conveniently located push-button switch lights the bulb. *Claud S. Gordon Co.*

For more data, circle No. 614 on card

Dry Parting Agent

G-E 12316 two-stage powdered phenolic resin has been successfully employed as dry parting agents for core boxes. In its new function, the powdered resin is dusted on the core box. Picked up by the cores, the resin melts in the baking oven and hardens. *General Electric Co.*

For more data, circle No. 609 on card

Crane Truck

Designed for transporting long, hard-to-manage loads in confined areas, and to reach into normally inaccessible areas, a 6000-lb-capacity crane truck has been developed. Crane has a travel speed of four mph without load and 3½ mph with full load. Boom measures 19 ft 2 in. *Elwell-Parker Electric Co.*

For more data, circle No. 615 on card

Push-Type Cranes

Light duty model industrial push-type cranes, available in five different capacities, and heavy duty models available in seven capacities, have been announced. Construction features are described in catalog PT-1253. *Industrial Crane & Hoist Corp.*

For more data, circle No. 610 on card

Cope and Drag Sealer

Kopeseal No. 975, new soft, bead-type ready-to-use compound for cope and drag sealing is now being distributed. Claims for compound include ready-to-use packaging; eliminates blows, fins and run outs; gives perfect joints; and will not freeze. *Frederic B. Stevens, Inc.*

For more data, circle No. 611 on card

Standard Pig Alloys

Two new standard pig alloys, suitable for the manufacture of a broad range of commercial aluminum castings, are now available. Designations of the new standard products are 2364 and 2393, and 50-pound pigs are available for immediate shipment. *Kaiser Aluminum & Chemical Sales.*

For more data, circle No. 612 on card

Equalizing Sling

Adjust-A-Log Equalizing and Locking Sling handles unbalanced and "hard to get hold of" loads as easily as simple loads. As the tension of the lift comes on, legs automatically adjust themselves and frictionally lock in position. The load is raised level. *Caldwell Co.*

For more data, circle No. 613 on card

More data, information, prices can be obtained in all advertised and listed products, bulletins, services by using postage-free Reader Service card

Reader Service Dept. 54|11

Please have manufacturer send me without obligation information or bulletins indicated by numbers circled.

For uncoded advertisements show name of advertiser on line below.

....

PRODUCTS & PROCESSES				596	597	598	599
600	601	602	603	604	605	606	607
608	609	610	611	612	613	614	615
FREE INFORMATION				616	617	618	619
620	621	622	623	624	625	626	627
628	629	630	631	632	633	634	635
636	637	638	639	640	641	642	
ADVERTISED PRODUCTS & SERVICES						643	644
645	646	647	648	649	650	651	652
653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668
669	670	671	672	673	674	675	676
677	678	679	680	681	682	683	684
685	686	687	688	689	690	691	692
693	694						

★ Please print or type information below

NAME

TITLE

COMPANY

ADDRESS

CITY AND ZONE

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 14680, Sec. 34.9 P. L. & R. CHICAGO, ILL.

Reader Service Dept.

AMERICAN FOUNDRYMAN

Golf & Wolf Roads

Des Plaines, Illinois

Free Foundry Information

Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20

Skip Hoists

Bulletin No. 110 shows sequence views of operation of weigh type and plug feed loading gates. Lists capacities of various size buckets. Is profusely illustrated to show adaptation to handling a wide variety of different materials. *C. O. Bartlett & Snow Co.*

For more data, circle No. 616 on card

Rotoblast Barrels

Bulletin No. 226 describes the various models of Continuous-Flo Rotoblast barrels available for production line blast cleaning. Booklet shows photos of the machines in operation as well as diagrams of some of the various models. *Pangborn Corp.*

For more data, circle No. 618 on card

Polishing Table

Bulletin now available describes steel polishing tables for the metallurgical laboratory. Several models are illustrated and diagrams of various types of polishers are included. Tables are desk height and have an oversize wash bowl and swing spouts to supply water. *Buehler, Ltd.*

For more data, circle No. 620 on card

Shell Molding

Brochure CDC-272 describes the latest developments in shell molding and the benefits offered by this process to foundrymen and buyers of foundry products. Latest information on resins and new foundry techniques are also included. *General Electric Co.*

For more data, circle No. 617 on card

Jib Cranes

Bulletin J-345 describes pillar type base mounted jib cranes, wall bracket type, bracket pillar, mast type, mast type with rods, and mast type jib crane—compression brace. Other types of industrial cranes are also illustrated. *Industrial Crane & Hoist Corp.*

For more data, circle No. 619 on card

Storage Bins

Bulletin 1153-8 describes and illustrates the Kalamazoo vitrified glazed tile industrial storage bins. Lists long life, resistance to corrosion, fireproof, weatherproof and by diagram shows the construction of the units. Typical installations are shown. *Kalamazoo Tank and Silo Co.*

For more data, circle No. 621 on card

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Permit No. 14680, Sec. 34.9 P. L. & R. CHICAGO, ILL.

Reader Service Dept.

AMERICAN FOUNDRYMAN

Golf & Wolf Roads

Des Plaines, Illinois

Refractory Concrete Manual

New basic booklet, "Refractory Concrete Manual" has just been published. Manual covers the basic information on recommended practice for mixing and placing refractory concrete. Sections are devoted to description of special properties of refractory concrete. *Lumnite Div., Universal Atlas Cement Co.*

For more data, circle No. 622 on card

Core Coating

Technical Bulletin F-123 describes Stevens Peneseal Core Coating and Technical Bulletin F-124 covers Stevens Yellow Jacket Core Wash. Suggested ranges for dipping or spraying and for brushing and swabbing are included in the bulletins. *Frederic B. Stevens, Inc.*

For more data, circle No. 623 on card

Reader Service Dept. 54|11

Please have manufacturer send me without obligation information or bulletins indicated by numbers circled.

For uncoded advertisements show name of advertiser on line below.

PRODUCTS & PROCESSES 596 597 598 599
600 601 602 603 604 605 606 607
608 609 610 611 612 613 614 615

FREE INFORMATION 616 617 618 619
620 621 622 623 624 625 626 627
628 629 630 631 632 633 634 635
636 637 638 639 640 641 642

ADVERTISED PRODUCTS & SERVICES 643 644
645 646 647 648 649 650 651 652
653 654 655 656 657 658 659 660
661 662 663 664 665 666 667 668
669 670 671 672 673 674 675 676
677 678 679 680 681 682 683 684
685 686 687 688 689 690 691 692
693 694

★ Please print or type information below

NAME

TITLE

COMPANY

ADDRESS

CITY AND ZONE

Safety Equipment

Booklet No. 5000-4 is designed to assist industrial plants in choosing safety and rescue equipment for use in emergencies. Discusses equipment needs of a rescue team, engineering team, and a medical team, and contains a table-of-equipment check-chart. *Mine Safety Appliances Co.*

For more data, circle No. 624 on card

Handbook on Fork Truck

New 28-page treatise, "Why the Small Fork Truck?", shows how small and medium sized plants can compete with big business in material handling efficiency. Booklet analyzes the space, time and labor factors involved in small plant operation. *Market Forge Co.*

For more data, circle No. 625 on card

continued on page 20

bake cores of widely varying sizes and shapes in

COLEMAN TOWER® OVENS

Only Coleman Tower Ovens have the exclusive features of accurate controls and flexibility which permit you to bake cores of widely different sizes and shapes at the same time with consistent uniformity.

A midwestern foundryman writes "...cores ranging in size from small pin type weighing a few ounces to cores weighing over 100 pounds are baked in one cycle with no rebake, cooled and ready for finishing. Core breakage and rejects are negligible compared to former practice. We are more than pleased with our entire operation."

No other method bakes cores at lower cost because of these Coleman Tower Oven features:

GREATEST SAVINGS IN LABOR resulting from the most efficient handling methods.

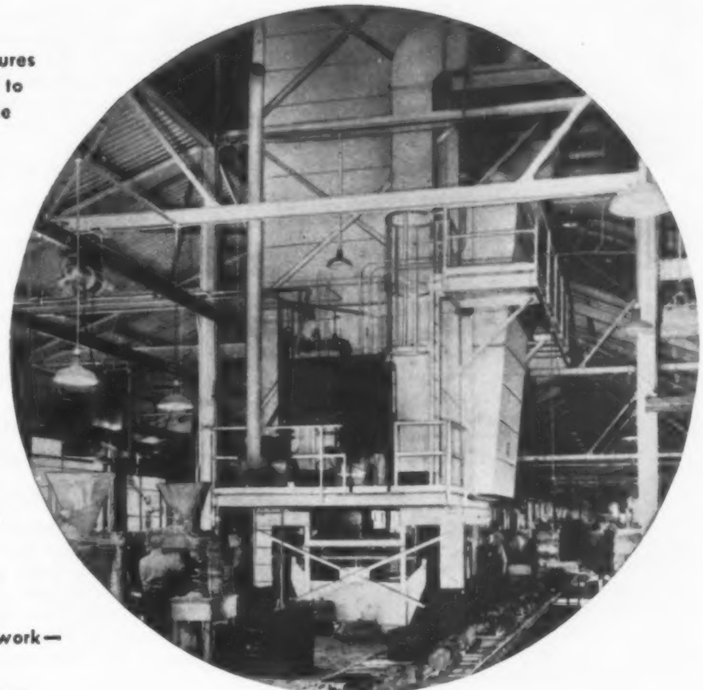
MOST EFFICIENT USE of your available production floor space.

LARGEST FUEL SAVINGS by using the most economical fuel available.

USE OF MOST SATISFACTORY BINDERS for your work—oil or resin.

LOWEST MAINTENANCE COST for upkeep and service.

Write for Bulletin 54



Coleman Tower Ovens use only 25% of floor space required by batch type ovens of same capacity.

Patented Open Center permits close, efficient grouping of coremakers around the oven... results in increased coremaker productivity.

3-way loading feature increases accessibility 300% over ordinary vertical oven designs.

Recuperative cooling system "smokes-off" and cools the cores before they reach unload station.

Coleman Tower Ovens quickly pay for themselves out of savings in labor, fuel and by reducing losses. Our engineers are available, without obligation, to make practical recommendations for your particular requirements.

A COMPLETE RANGE OF TYPES AND SIZES

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

MEMBER FEMA

THE FOUNDRY EQUIPMENT COMPANY

1825 COLUMBUS ROAD CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

For more data, circle No. 656 on postage-free Reader Service card, p. 17 or 18

Free Foundry Information

continued from page 18

Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20

Iron Castings Glossary

"Glossary of Terms for Producers and Users of Iron Castings," 36-page book, explains over 150 technical terms that are used in common between suppliers and users of ferrous and non-ferrous castings. Offered to increase mutual understanding. *International Nickel Co.*

For more data, circle No. 626 on card

Grinding Wheel Catalog

Catalog 1052, 28-page illustrated booklet covers grinding wheel selection in detail. Principal feature is the supplement of net prices to the customer in various quantity lots. Easy to use tables serve as a ready guide for wheel selection. *Norton Co.*

For more data, circle No. 632 on p. 18

Metal-Working Paints

Catalog, "Paints for Metal-Working Plants," includes a complete line of metal-working maintenance paints in ten categories, with where and how to use outlines. Special attention has been given to making the catalog indexing and layout concise and clear. *Flexrock Co.*

For more data, circle No. 637 on p. 18

Gases and Air Cleaner

Bulletin No. 4 describes the Impingo Filter for cleaning hot, wet and corrosive gases and air. Included are a variety of installation photos, engineering drawings of filter components and complete systems, as well as descriptive data. *Mechanical Industries, Inc.*

For more data, circle No. 627 on card

Conveyor Belts

Bulletin T-241 on conveyor belts for heat-treat furnaces has just been issued. It describes the manufacture and testing of Thermalloy general purpose belts as well as one for heavy-duty service. Drawings show staggered link design. *American Brake Shoe Co.*

For more data, circle No. 633 on p. 18

Wet Sand Reclamation

Bulletin No. F-2033 C lists informational questions and answers concerning wet sand reclamation systems. Diagrams of the unit and sand reclamation cost estimate table are included. Physical properties comparison of new and reclaimed sand is also shown. *Eimco Corp.*

For more data, circle No. 638 on p. 18

Audiometric Testing Room

Bulletin AT-14 illustrates the new I.A.C. Standard Audiometric Testing Room. Booklet describes methods of testing employee hearing through the use of this prefabricated testing room and results which should be obtained. *Industrial Acoustics Co., Inc.*

For more data, circle No. 628 on p. 18

FREE TEAR SHEETS

of all AMERICAN FOUNDRYMAN articles are available on request. Keep your magazine intact and pass it on for others to use. For free tear sheets, write to Editor, AMERICAN FOUNDRYMAN, Golf & Wolf Roads, Des Plaines, Ill. Please show company connection and your title on tear sheet request.

Spectrophotometers

Bulletin 303-A lists information on Spectrophotometers Models B and DU. Amply illustrated, booklet also lists miscellaneous accessories, attachments, and replacement parts. Precision sample cells, rectangular cells, and others are also covered. *Beckman Instruments, Inc.*

For more data, circle No. 639 on p. 18

Bonding Mortar

Two types of high temperature, cold-setting bonding mortars, Harwaco Bond and Thermolith, are described in new bulletins just published. They explain what it is, where it is used, how to use it, and its outstanding features. *Harbison-Walker Refractories Co.*

For more data, circle No. 629 on p. 18

Utility Charges Savings

Substantial savings on electric, gas, water and steam bills for commercial and industrial firms, is the subject of a 20-page booklet just issued. "The Rateonics Story," states that many business men pay utility bills without knowledge of minimum rates, metering or billing procedure. *Rateonics Corp.*

For more data, circle No. 634 on p. 18

Cylinder Automation

Pamphlet, "A Cylinder Program for Automation and Heavy Duty Service," highlights standardization of critical cylinder mounting dimensions and stroke lengths, interchangeable detachable mountings, and immediate delivery of a wide variety of sizes and models from stock. *Miller Fluid Power Co.*

For more data, circle No. 640 on p. 18

Chrome-Magnesia Refractory

Bulletin G-101, "Gunchrome-M," describes chrome-magnesia base refractory, designed for gun emplacement, used chiefly for maintenance for critical areas in open hearth and electric steelmaking furnaces and soaking pits. Outlines advantages and uses. *Basic Refractories, Inc.*

For more data, circle No. 630 on p. 18

Hardness Tester

Brochure F 1689-2 presents data on the Barcol Impressor, a portable hardness tester for aluminum, aluminum alloys, copper, brass, and other materials including plastics. Hardness reading is indicated on dial as instrument is lightly pressed against material. *Barber-Coleman Co.*

For more data, circle No. 635 on p. 18

Dry Type Collector

Pamphlet describes the Aerodyne, a dry mechanical type collector, which is designed for operations involving particulate matter ranging from 1 micron up in size; gas stream grain loadings up to 5.0 grains per cf; and low static pressure loss through the collector. *Aerodyne Development Corp.*

For more data, circle No. 641 on p. 18

Platform Truck

New four-page folder details 4000 lb capacity, high lift platform truck with four-wheel steering, powered either by electric or gasoline-electric equipment. Includes diagrams of turning areas and further details on construction. *Elwell-Parker Electric Co.*

For more data, circle No. 631 on p. 18

Measuring Instruments

Bulletin No. 100 contains complete manufacturing program of photoelectric and electronic measuring instruments. New edition comprises a number of recently developed items, with particular attention given to the pH Meters, listed on the back page. *Photovolt Corp.*

For more data, circle No. 636 on p. 18

Crucible Care

First in a series of periodic leaflets, known as "'Crucible Charlie' says," has just been issued. Deals with "Proper Crucible Care" and contains helpful information on receipt and inspection, storage, and cleaning of crucibles. *Crucible Manufacturers' Association.*

For more data, circle No. 642 on p. 18

Letters to the Editor

Letters should be addressed to American Foundryman, Golf & Wolf Roads, Des Plaines, Ill. Letters must be signed but will be published without signature on request.

Reheat Not Necessary

In the June issue of AMERICAN FOUNDRYMAN, page 61, the story *"Development of a West Coast Steel Jobbing Foundry"* contains a description of grinding ball production. The story states: "The hot castings go up an incline and dump into an outdoor quenching tank." Is this the only heat treatment given the balls? How can steel be satisfactorily heat treated from above the critical range, as cast? I have been under the impression that after casting, the steel should cool to some temperature below the critical range, then be reheated to above the critical before quenching to get anything like a satisfactory heat treatment.

Melting Superintendent
Steel Foundry

We are attempting to develop hardness and abrasion resistance without the additional cost of refining the as-cast grain structure of the steel. We do not believe the additional expense involved in reheating and handling would be justified as we are not troubled by breaking or cracking of balls in service.

The hardening of the steel is developed by the rapid cooling through the critical temperature range. This, combined with the retarding influence of the carbon, prevents the complete transformation of austenite into pearlite, resulting in the martensitic structure that gives the steel its hardness.

To prevent cracking and brittleness, the balls are withdrawn from the quenching bath when completely black at approximately 700 F so that a tempering process results from the relatively slow cooling to atmospheric temperature. Our water-quenched grinding balls of eutectoid composition with small additions of chromium consistently average 585 Brinell hardness.

JOHN C. TENOLD, *President*
Spokane Steel Foundry Co.
Spokane, Wash.

Says Gray is Correct

I was very much interested in the comments of Mr. Rentschler regarding the spelling of *gray* in gray iron (AMERICAN FOUNDRYMAN, October, page 24). I often run into this matter when giving the name of our organization over the phone or at some reception desk. The proper way to spell the word is with an *a* not an *e*, and I favor bringing this to the attention of publishers of books

continued on page 24

Letters

continued from page 22

and trade magazines. A.S.T.M. and all technical societies in this country spell the word with an *a* and it seems that the misspelling is most apt to occur when the term is used by persons not familiar with its common usuage.

Although the question may seem strange to a gray iron foundryman, I have actually been asked by several persons unfamiliar with metallurgy and foundry practice if *gray* iron is the same as *grey* iron!

It would seem desirable and proper for the American Foundrymen's Society or the Gray Iron Founders' Society to promote the correct spelling of gray iron. When publishers receive manuscripts or advertisements with the word incorrectly spelled, they should be instructed to advise the persons submitting the material to change the spelling.

I would also suggest that the foundry practices as described in the *Encyclopedia Britannica* be reviewed by the editorial staff of AFS to see that descriptions are representative of American practice as well as European practice. In examining the 1945 edition I note that gray iron is always spelled *grey* and the description of foundry practice for making sanitary ware and subsequent vitreous enamelling by the dry process is more representative of European practice than American practice although no such indication is given.

I have not examined a later edition of *Britannica* and do not know whether the condition has been corrected. It would seem worthwhile to examine all of the latest editions of dictionaries, encyclopedias, etc., to see if the foundry process, and specifically the production of gray iron castings, is properly described.

D. E. KRAUSE, *Executive Director*
Gray Iron Research Institute, Inc.
Columbus, Ohio.

Likes Round Table

We were very impressed with your pH Round Table as published in the September issue of AMERICAN FOUNDRYMAN (pages 34-39). It was of interest not only because our superintendent, Dan Lucas, participated, but because we like this means of presenting information.

JOHN MCBROOM, *President* Stainless Foundry & Engineering Co.
Milwaukee

Makes Shells from Matchplates

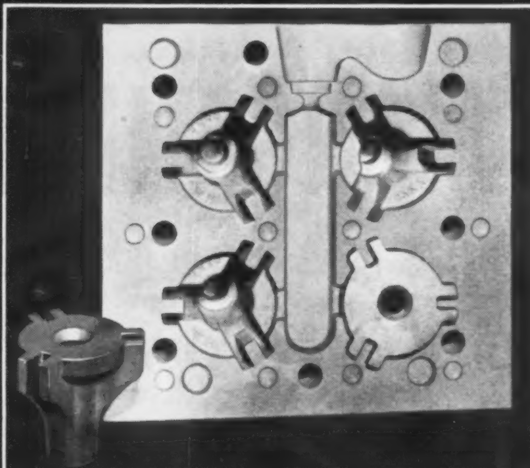
In the September issue of AMERICAN FOUNDRYMAN, there was an inquiry in Letters-to-the-Editor from a firm asking about getting sample shell-mold castings from a matchplate.

We can give them samples from a regular plate. We make shell castings in bronze, brass, and aluminum. We also have a source for pouring iron into shells we make.

CHARLES LAY
Eagle Bronze & Aluminum Co.
Norwich, N. Y.

RESINOX

FOR SHELL MOLDS



Resinox gives this deep-draw shell mold the vertical strength required, yet precision castings come out clean, need little if any finishing.

FOR SHELL CORES

Shell cores, made with Monsanto resins, have cold strength to withstand rough handling yet shake out easily. Note fine reproduction of thread detail.

Cuts casting costs from the inside out

Report after report from some of the nation's major foundries prove that there are important differences in foundry resins, and that Monsanto resins save man-hours, cut finishing costs and practically eliminate the reject problem.

Resinox foundry resins produce shells and cores with good dimensional stability for close tolerance work, high hot strength, penetration resistance and collapsibility – all prime areas where resin quality is the key to cost control.

You can cut production costs and build quality into your castings from the inside out by using Resinox resins for shell molds and shell cores.

For full information on Monsanto's quality line of foundry resins for shell molding, core binding and sand conditioning, write today to MONSANTO CHEMICAL COMPANY, Plastics Division, Room 5610, Springfield 2, Mass.

Resinox: Reg. U. S. Pat. Off.

Meet more Monsanto products on CBS-TV "Morning Show"

MONSANTO

SERVING INDUSTRY . . . WHICH SERVES MANKIND

For more data, circle No. 662 on postage-free Reader Service card, p. 17 or 18

Foundrymen in the News

Edward R. Anderson has been elected a vice-president of American Brake Shoe Co. He also continues as president of the AmForge Div. of the company. The National Bearing Div. of the company has announced the appointments of **Norman Birch** as vice-president in charge of operations; **I. Eugene Cox** as vice-president in charge of engineering and development; **Bernard Esarey** as works manager of the Meadville, Pa. plant; and **John E. Fries, Jr.** as chief metallurgist. Mr. Birch and Mr. Cox will be located at the Division headquarters in St. Louis, Mo. Mr. Esarey continues as chief engineer of the National Bearing Div. in addition to his new job. Mr. Fries will continue to be located at the division's Meadville, Pa. plant, where he was formerly plant metallurgist.

Arthur J. Miller, Jr., has been elected president and general manager of the Chicago Wheel & Mfg. Co., Chicago, succeeding **A. J. Miller, Sr.,** who was named chairman of the board. Mr. Miller, Jr. was formerly treasurer and factory manager of the company's Valparaiso, Ind., plant. Other officers elected were: **Henry E. Miller,** vice-president and general production manager; **Henry M. Mann,** treasurer and chief of sales engineering; and **Arthur T. Dalton,** secretary and general sales manager. **I. Danielson** was elected vice-president emeritus, and will continue on in his capacity of adviser on financial matters.

E. Q. Sylvester, executive vice-president, Griffin Wheel Co., Chicago, has been named to receive the Melville Prize Medal. The award, which is administered by the Board on Honors of the American Society of Mechanical Engineers, is conferred annually for the best original paper on mechanical engineering subject presented for discussion and publication to the Society. Mr. Sylvester's paper, "Pressure Pouring Steel Car Wheels in Permanent Molds," was presented before a joint session of the A.S.M.E. Railroad Div., the A.S.M.E. Research Committee on Metal Processing, and the A.S.T.M. at the 1953 annual meeting of the A.S.M.E., in New York City.

J. P. Coughlin has joined Eutectic Welding Alloys Corp., Flushing, N. Y., as assistant to the president, Rene D. Wasserman. Mr. Coughlin was former manager of the Arc Welding Div., Westinghouse Electric Co., Buffalo, N. Y.

E. C. Rook has been appointed vice-president and general manager of the Blaw-Knox Equipment Div., Blaw-Knox Co., Pittsburgh, Pa. He assumes the management of the company's largest fabricating unit, which has its main plant at Blawnox, Pa., and a branch plant at Elyria, Ohio. Originally of Youngstown, Ohio, Mr. Rook spent 34 years in the naval service.

Walter M. Goldhamer, vice-president of Superior Die Casting Co., Cleveland, was awarded the Doehler Award, the highest prize of the die casting industry, at the American Die Casting Institute's 26th Annual Meeting held in Chicago.

Anthony L. Panzica, Buffalo, N. Y., was named recipient of the 1954-55 scholarship in metallurgical technology, established by Electro Refractories & Abrasives Corp., Buffalo, N. Y., at the Erie County Technical Institute, Buffalo. He will receive one year's tuition at the institute.

Hugh Gibbons was appointed supervisor of the Rx Met. Div., Michigan Steel Casting Co., Detroit, Mich. He was formerly plant superintendent at Cannon Muskegon Corp. and prior to that was assistant superintendent at the Hillsdale Foundry Co., Hillsdale, Mich.

Frank A. McBrearity has been named Philadelphia branch manager of the Industrial Rubber Products Div., Raybestos-Manhattan, Inc., succeeding G. R. Van Duser. **Howard W. Smith** succeeds Mr. McBrearity as sales representative for the Central New York area.

The following changes in sales personnel have been announced by Norton Co., Worcester, Mass.: **Charles M. Wellons,** formerly field engineer at the Philadelphia district office, has been named an abrasive engineer; **Robert C. Divoll,** has been appointed an abrasive engineer for part of the Pittsburgh, Pa., territory; **Charles R. Garfield,** field engineer at the Pittsburgh district office; **William J. Mahan,** field engineer for abrasive grain applications; and **Joseph F. Hartl,** sales engineer, abrasive grain.

George Polanka has been appointed sales engineer for the Shell Process, Inc., Chicopee, Mass., covering Ohio, Western Pennsylvania, Western New York State, Western Virginia and Kentucky territory. For the past seven years he was chief engineer of the Metallurgical Products Div., Thompson Products Co., Cleveland.

John H. Sibbison, Jr., has joined Kerchner, Marshall & Co. as a metallurgical sales engineer in the Cleveland district. He was formerly with the American Fire Clay Products Co., Canfield, Ohio.

Robert G. Matters has been named an assistant director of research at Allis-Chalmers Mfg. Co., Milwaukee. He was a metallurgist for the firm from 1935 to 1945 when he was named assistant superintendent of the chemical and metallurgical laboratories. In 1950 he was made a research supervisor.

Dr. Howard W. Barlow has been made director of the Washington State Institute of Technology, a part of the State College of Washington at Pullman. He was formerly Dean of Engineering at Texas A. & M. College and succeeds **Dr.**

continued on page 30

N. Birch . . . vice-president

B. Esarey . . . works mgr.

E. R. Anderson . . . elected v-p

E. Cox . . . promoted

M. L. Steinbuch . . . successor

J. W. Bolton . . . retires

J. F. B. Jackson . . . changes

C. E. Peterson . . . chief metallurgist

continued from page 28

William A. Pearle, who resigned to accept the position of Administrator of the Bonneville Power Administration.

Charles E. Peterson has been appointed chief metallurgist of Mackintosh-Hemphill Co., Pittsburgh and Midland, Pa. He has been assigned a major responsibility for the technical phases of producing cast iron and steel rolls, cinder pots and other company products. Mr. Peterson joined Mackintosh in 1949 as a metallurgical assistant. He left the company in 1953 and until recently was sales and research metallurgist for the Rolls Div., Blaw-Knox Co. He is a member of A.S.M. and A.I.M.E.

John W. Bolton has retired as chief metallurgist and research director of Lunkenheimer Co., Cincinnati, Ohio, and **Marvin L. Steinbuch** has been appointed as his successor. Mr. Bolton joined the firm in 1926. Active in the technical affairs of AFS, particularly in the gray iron and non-ferrous division, he was the first chairman of the latter. He is the author of "Gray Cast Iron," and has written many technical and research papers. Mr. Bolton is a member and former national director of A.S.T.M.; member of A.S.M. and A.I.M.M.E.; and is on committees of A.S.M.E., the Manufacturers Standardization Society of Valve & Fittings Industry, and the American Welding Society. Bolton was awarded the John A. Penton Gold Medal of AFS in 1937, on the basis of published research work; the I.B.F. Exchange Paper in 1929; and the Exchange Paper to the Belgian Foundrymen's Association in 1925.

Mr. Steinbuch joined Lunkenheimer's metallurgical research and testing division in 1947. He was appointed departmental head of Structural Metallurgy in 1952, and assistant director of the division prior to being named chief metallurgist and research director. He is a member of AFS, A.S.M., and secretary of Committee F-1, of Committee B-5 of the A.S.T.M.

Clarence G. Bieber has been appointed head of the Special Alloys Section, Bayonne Research Laboratory of the International Nickel Co., Inc., and **George R. Pease,** head of the Welding Section, and **W. W. Sellers,** head of the Electrochemical Section. Mr. Bieber joined Inco in 1924, Mr. Pease in 1945 and Mr. Sellers in 1944.

Ralph F. Hornbach, who for the past four years has been director of purchasing for the Geo. D. Roper Corp., Rockford, Ill., has been named general manager of the newly-created Special Products Div. This division will seek to utilize excess productive capacities in the plant, particularly in the enamel, press and foundry departments.

R. S. M. Jeffrey, B.Sc., F.R.I.C., director of Federated Foundries Limited, has been appointed by I.B.F. to present the official exchange paper at the 1955 AFS Convention in Houston. The title of Mr. Jeffrey's paper will be "Developments in the Light Castings Industry Including the New Die Pressing Process." Mr. Jeffrey joined Federated as chief metallurgist. In 1950 he was appointed director of technical developments and in 1952 became a full director.

Richard E. Babcock has joined the Federal Foundry Supply Co., Cleveland, and will represent the firm in the lower Peninsula of Michigan with the exception of the Detroit area and will cover a few of the fringe towns in Northern Indiana. Before joining the sales staff of Federal, he was employed at several Michigan foundries in the Grand Rapids and Muskegon area.

J. F. B. Jackson, B.Sc., A.R.I.C., F.I.M., (member) has resigned his position as director of the British Steel Castings Research Association and is joining the Board of A.P.V.-Paramount Ltd. of Crawley, Sussex, England, as deputy managing director.

Frank L. Colker, Frank L. Colker Co., Detroit, has been appointed Michigan sales representative for the Elwell-Parker Electric Co., Cleveland.

R. E. Babcock . . . joins Federal

R. F. Hornbach . . . gen. mgr.

R. S. M. Jeffrey . . . exchange author

C. G. Bieber . . . section head

PHILCO CORP. DEXTER FOUNDRY DIVISION FAIRFIELD DISCOVERS RIMCO

Foundry Superintendent Roy Ray (above right) checks with Dale Lyons, Molding Foreman Assistant, on the many advantages of the RIMCO Squeeze Board. They give us seven basic reasons for their switch to RIMCO:

1. Save 3 to 4 seconds per mold because smooth surface means faster handling—2. No deflection—3. Lasting up to eight times longer—4. Lower maintenance cost—5. Less loose sand—6. Lower scrap percentage—7. More uniform squeeze

You'll agree that any one of the seven is reason enough to choose RIMCO.

Free Sample

Send for a free sample of this money-saving RIMCO Squeeze Board. Examine the polished Resinwood faces. Figure up what you could save in your own plant. Write us for further information, or . . . ask any representative of

THE FEDERAL FOUNDRY SUPPLY CO.

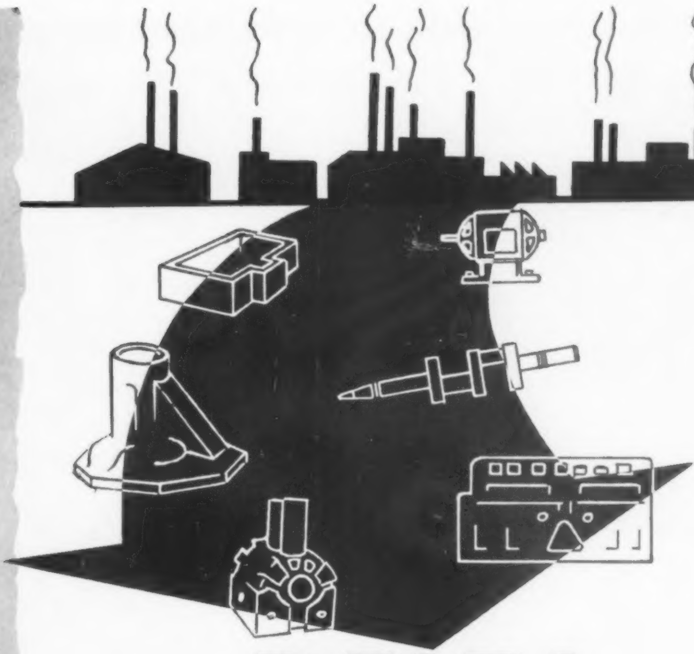
Cleveland • Crown Hill, W. Va. • Chicago • Detroit • Milwaukee
Richmond, Va. • St. Louis • Chattanooga • New York • Upton, Wyoming

QUALITY Since 1868 RIMCO MILLWORK

ROCK ISLAND MILLWORK COMPANY

RESINWOOD DIVISION
Rock Island Illinois

For more data, circle No. 667 on postage-free Reader Service card on p. 17 or 18



The Winner . . and New Champion, Wheelabrator® Steel Shot

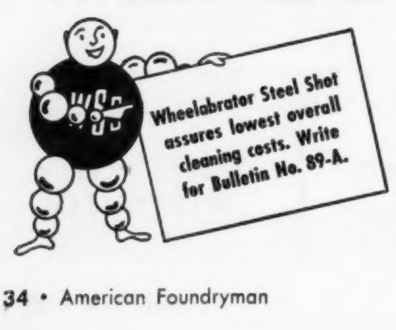
Scores Easy Victory in Blast Cleaning Performance at Swayne, Robinson & Co.

Scoring a 56.6% decrease in blast cleaning abrasive costs, Wheelabrator Steel Shot proved its superiority over a malleable iron abrasive at Swayne, Robinson & Co., Richmond, Indiana in cleaning gray iron castings. As a result of the cost-slashing performance of this superior electric furnace steel shot, an abrasive saving of 86.8c was effected in cleaning every ton of castings.

These additional benefits further established Wheelabrator Steel Shot as the abrasive champion at Swayne, Robinson & Co. With its faster cleaning action, a reduction of three hours daily in the use of their Wheelabrator Tumblast was possible. Casting tonnage which had formerly required seven hours cleaning time is now Wheelabrated in just four hours.

Maintenance labor and machine wear were reduced, effecting additional savings. Quality of cleaning was greatly improved making possible the elimination of tumbling mills formerly used for desired surface appearance of certain types of castings.

Results like these can be duplicated in your cleaning room, too. Wheelabrator Steel Shot is produced under the most rigid controls to provide a metallurgically superior steel shot of uniform quality for the maximum economy in blast cleaning. It will clean faster at lower cost than any other abrasive. Try it and prove it for yourself.



American
WHEELABRATOR & EQUIPMENT CORP.

630 S. Byrkit St., Mishawaka, Indiana

WHEELABRATOR STEEL SHOT

For more data, circle No. 669 on postage-free Reader Service card on p. 17 or 18

Talk of the Industry

CHEMICALLY-BONDED BRICK are outlasting other refractories in the forehearth of a Wisconsin gray iron foundry 3 to 2. Goes far beyond offsetting higher cost of the brick. The unusual refractory, which does not require firing during manufacture, is reported to be outstanding under non-oxidizing conditions where its carbon content is not affected.

I TRAVELLED throughout the Lone Star State in August and everywhere I found the most lively and friendly interest in the forthcoming visit of the nation's foundrymen to Houston for the convention next May. You may be sure of a rousing welcome, writes A. W. Vogle, vice-president of sales and traffic, DeBardeleben Coal Corp., Birmingham, Ala., in a newsletter. A tentative program for the 1955 AFS Convention and an advance story on some of the meetings (see page 67) gives foundrymen an idea of what they'll find next May in Texas, along with Lone Star hospitality.

POWDER METALLURGY has invaded the foundry! Muskegon Piston Ring Co., Muskegon, pioneer producer of cast piston rings, is producing powdered metal automotive rings in its Sparta foundry—notable previously for cupola air control. Object of the powdered metal rings is thinness with resultant lower horsepower losses due to friction.

THIS ABC BUSINESS . . . what's with AMERICAN FOUNDRYMAN anyway? A number of our readers have asked this question—or one like it—ever since "The Foundrymen's <u>Own</u> Magazine" began displaying the ABC symbol on page 3. ABC stands for Audit Bureau of Circulations and AF is one of 3575 members of the organization. Object of ABC is to guarantee to advertisers that their ads will reach the kind and number of people we say they'll reach. ABC is insurance for advertising funds invested with its members. A voluntary, non-profit organization of publishers, advertising agencies, and advertisers, the Audit Bureau just celebrated its 40th birthday . . . 40 years as guardian of circulation integrity . . . 40 years since it brought order out of circulation chaos. AMERICAN FOUNDRYMAN is the only ABC magazine in the foundry field.

TACONITE pellets at the rate of 12,000 tons a day will be turned out at the E. W. Davis Works (Silver Bay, Minn.) of Reserve Mining Co. to fill in the gap as the rich Mesabi ores are depleted in the not-too-distant future. The hard, abrasive taconite would eventually become the high-grade, much-sought iron ore of today but ferrous foundries and the steel industry can't wait the necessary several thousand years.

TIN SUPPLY of the United States is not endangered by the Communist triumph in Indo-China according to the Malayan Tin Bureau. Indo-China is not an important producer of tin . . . Malaya, Indonesia, and Thailand are the largest tin-producing countries in Southeast Asia . . . Thailand adjoins Indo-China, but Malaya and Indonesia are more remote . . . Malaya is winning its war against Communist-led terrorists.

AFS Headquarters in Des Plaines, Ill., where the Society has settled down in its own building—America's first foundry technical center—after 58 years in various rented offices.

F. C. Riecks

R. J. Teetor

W. L. Woody

Climax of a campaign that started over four years ago will be reached Thursday, November 18, when the new headquarters building of the American Foundrymen's Society at Golf & Wolf Roads, Des Plaines, Ill., will be dedicated. With the entire foundry industry invited, the event is expected to be attended by numerous foundrymen, industry leaders, and AFS officials.

Formal dedication will take place at 2:30 pm. AFS President F. J. Dost, Sterling Foundry Co., Wellington, Ohio, will preside. Following ceremonies and flag raising, the new building will be open to visitors from 1:00 to 5:00 pm.

Visitors will see a modern 11,000-sq ft brick building designed for maximum efficiency and low-cost maintenance. Essentially U-shaped, on a roughly triangular plot of nearly two acres, the building has ample natural light supplemented by built-in fluorescents, air conditioning, tile and terrazzo floors (concrete in the stock room), and fiberglas drapes. Décor is by Marshall Field & Co.

In addition to offices for the Society and American Foundryman, America's first foundry technical center includes a combined library and conference room, a stockroom for storage and mailing, facilities for small printing jobs, an addressing room, and a lunch room. Located 26 miles northwest of Chicago's Loop, the new AFS office is adjacent to the Cumberland Station of the Chicago & Northwestern RR and to U. S. Highway 14. It is readily accessible by rail, automobile, and bus.

Plan for a permanent AFS headquarters was proposed at the 1950 AFS Convention

Foundry Industry Invited . . .

Dedicate AFS Headquarters Nov. 18

W. L. Seelbach

I. R. Wagner

C. L. Carter

F. J. Dost

by Walton L. Woody, National Malleable & Steel Castings Co., Cleveland, then national vice-president. A Housing Committee with Past President Ralph J. Teetor, Cadillac, Michigan, as chairman was set up to determine the type and general location of building.

Funds contributed by more than 1000 individuals, companies, and AFS chapters were raised during the terms of Mr. Woody and the following past presidents: Walter L. Seelbach, Superior Foundry, Inc., Cleveland; I. R. Wagner, Indianapolis, Ind.; and Collins L. Carter, Albion Malleable Iron Co., Albion, Mich. Ground was broken during the term of Mr. Carter, November 17, 1953.

Owner representative in dealings with architects, engineers, and contractors has been Frank C. Riecks, Ford Motor Co., Dearborn, Mich. Staff liaison has been provided by Wm. N. Davis, AFS director of safety & hygiene & air pollution control.

You Are Invited

OPEN HOUSE and DEDICATION

of

"America's First Foundry Technical Center"

THE NEW

AFS HEADQUARTERS BUILDING

Golf & Wolf Roads Des Plaines, Ill.

Tel.—VAnderbilt 4-0181

THURSDAY, NOVEMBER 18, 1954—1-5 PM

R. S. V. P.

Woodrow W. Holden / *Chief Metallurgist*
Foundry Div., Eaton Mfg. Co., Vassar, Mich.

How Coke Size . . . Screening . . . Handling

Affect Cupola Melting

Proper selection, handling, and screening saves coke, increases melting rate, promotes maximum temperature. How it works in his plant was told by the author during a Gray Iron Shop Course session at the 1954 AFS Convention and Exhibit.

■ Every foundryman is concerned with the physical and chemical properties of the coke used in his cupola melting operations, but from a practical viewpoint his prime concern is receiving the proper size coke for his individual operation and the maintenance of that size during subsequent handling and melting operations.

During manufacture (dry distillation of coal) coke develops fissures which make it somewhat fragile. Although it is screened by the manufacturer before it leaves the coke plant, each subsequent handling produces more fines which are objectionable to efficient and controlled melting operations.

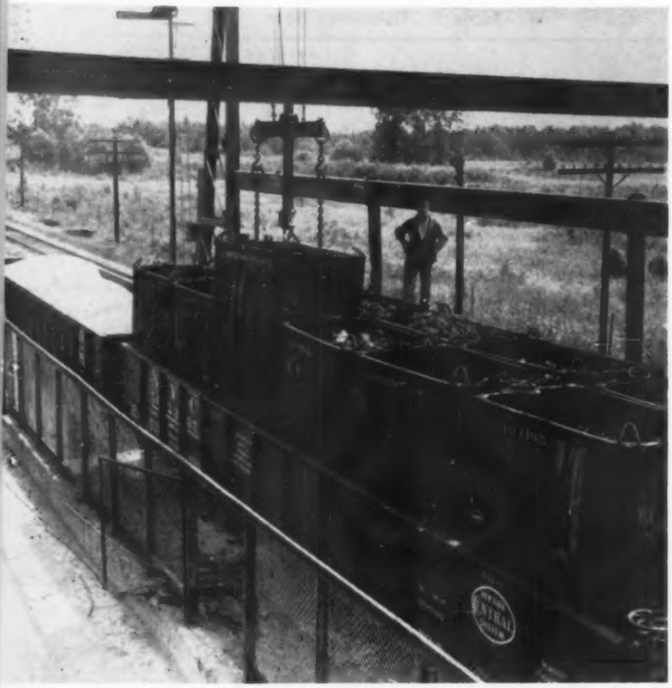
In the selection of a coke size for an individual operation, the diameter of the cupola should not be the only governing factor. There is a general relationship it is true. The use of larger coke (+4 or +5 inches) generally is conducive to faster melt rates and greater ease in obtaining maximum temperatures. This is due to its greater permeability, permitting the air and gases to penetrate the bed a greater distance. This in turn causes melting to occur over a greater area of the bed.

Sometimes, however, when sufficient penetration of the bed is not effected, large coke can cause excessive oxidation because of the narrow path of travel of the gases over a limited carbon surface. The effect of less carbon surface exposure is reflected further in the necessity for deeper beds. The oxygen in the air travels higher above the tuyeres before it is consumed which results in a broad, deep zone of maximum temperature. However, once the size of the coke has been determined for a given set of cupola melting conditions the primary concern of the metallurgist is the ability to maintain that size until it reaches the melting zone and is consumed.

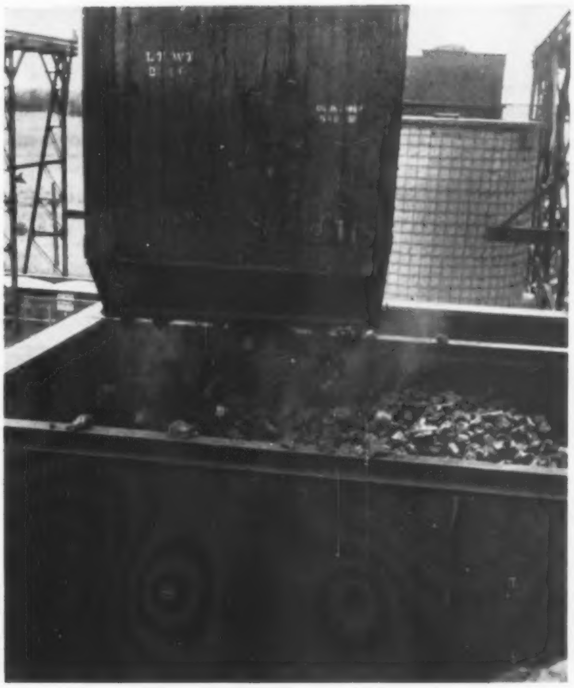
Pig iron and scrap storage area at back of Eaton Mfg. Foundry Div. plant. Coke storage hopper is at left.

The author believes that carbon solubility or control is more a function of bed conditions than of any other single factor. Contrary to some data, experience has shown that higher carbons are obtained with larger coke due to the broader, deeper zone that can be obtained.

The cupolas operated at Eaton Manufacturing Co., Foundry Div., are lined to 54 in. ID. A 5 x 6-in. screened coke is purchased delivered in container cars.



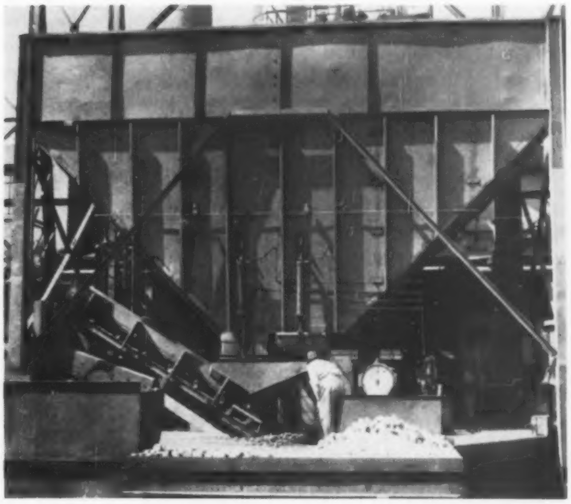
Screened coke is delivered in container cars. The individual containers are picked up . . .



. . . by a traveling bridge crane and moved to the coke storage hopper where they are discharged.

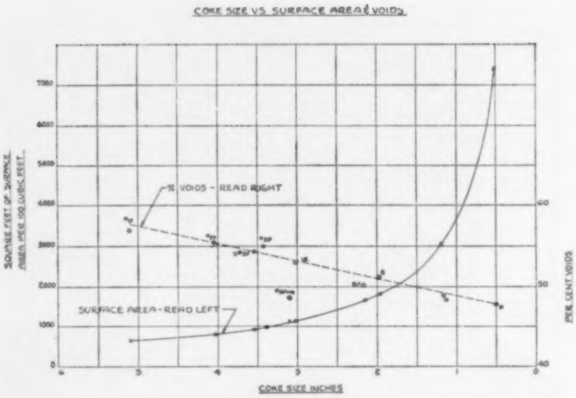
Minus 2-in. coke is removed by vibrating screens.

Charge make-up platform is at bottom of coke hopper.



The individual containers in the container cars are picked up by a traveling bridge crane and moved to the coke storage hopper where they are discharged. This type of unloading facilities eliminates many fines due to excessive handling. Before the coke reaches the charging bucket it passes over a screen containing both 2-in. and 3-in. screens. All coke minus 2-in. is rejected.

Why screen coke when all the physical properties are of concern? Size should be listed first, ahead of weight per cubic foot, porosity, cell size, etc., primarily because of its effect on the permeability of the bed. With



Relation between coke size, surface area, and voids.

Table 1. . Coke Size vs. Voids and Surface Area

Size	Solid Wt. per cu ft lb	Actual Wt. per cu ft lb	Per Cent Coke	Per Cent Voids	Avg. Size, In	Surface Exposed (Assuming Cubes) sq ft per 100 cu ft	sq ft per 100 lb
No. 1 Fdry	56.4	24.30	43.1	56.9	5.12	604	24.9
No. 2 Fdry	56.4	25.12	44.5	55.5	4.08	785	31.2
Spec. No. 3 Fdry	55.3	25.00	45.2	54.8	3.57	909	36.4
No. 3 Fdry	56.4	25.35	44.9	55.1	3.42	946	37.2
No. 3 Fdry and Nut	55.3	28.60	51.7	48.3	3.24	1150	40.2
Ind. Egg	56.4	26.60	47.2	52.8	3.051	1110	41.7
Blast Furnace	56.4	28.00	49.6	50.4	2.221	1604	57.3
Egg	56.4	27.40	48.6	51.4	1.973	1777	64.6
Nut	56.4	28.80	51.1	48.9	1.199	3070	106.6
Pea	54.5	28.40	52.1	47.9	0.51	7350	259.0

Table 2. . Operating Data

	11/2/48 Cold Blast with Fines	11/1/49 Cold Blast with +2-in. Coke	10/29/53 Hot Blast with +2-in. Coke
Cupola Diameter at Tuyeres, in.	54	54	54
Metal Charge Weight, lb	4000	4000	4000
Coke per Charge, lb	560-540	480-450-420	380
Iron to Coke Ratio, Actual	7.4 to 1	9.5 to 1	10.5 to 1
Limestone Charge, lb	120	70	55
Spout Temperature, F	2720-2840	2740-2820	2770-2860
Melting Rate, T/hr	13.6	14.1	14.4
Blast Rate, ave. cfm	6200	5100	4900
Blast Pressure, ave. oz	25	20	13
Tons Melted, 16 hr	218	226	230

Table 3. . Coke Usage 1948 to 1953 Inclusive

Year	Tons Melted	Tons Coke Used	Tons Breeze	Coke Ratio Including Breeze
1948	49,602	7397	0	6.7 to 1
1949	43,490	5607	191	7.5 to 1
1950	60,944	6072	399	10.7 to 1
1951	55,914	5258	267	10.1 to 1
1952	50,966	5089	189	9.66 to 1
1953	65,358	6824	309	9.2 to 1

Table 4. . Percentage of Coke Breeze Rejected To Total Coke Used

1950	6.16 per cent
1951	4.83 per cent
1952	3.59 per cent
1953	4.33 per cent

smaller coke, bed density increases and under the same pressure conditions the proper distribution of the gases becomes more difficult, causing an increase in gas flow next to the lining.

This results in increased burnout, colder iron, and inconsistent analysis. The situation is materially aggravated when the coke contains a wide range of particle sizes which fill in the voids between the larger pieces.

It is agreed that a coke of 2-in. average size with a volatile of 2.0 per cent will burn faster than a 2-in. coke with only 1.0 per cent volatile. The additional 1.0 per cent volatile lowers the ignition point and the oxygen present is more rapidly consumed. Likewise, decomposition of CO_2 begins sooner and proceeds faster. It seems right, also, to assume that this change in rate of reaction is also a function of coke size because of the difference in exposed surface area. Invariably, when coke size is decreased by design or accident, the maximum temperature zone is shortened and lowered closer to the point of oxygen entry into the bed. Variations in coke size during a heat usually result in and can account for many fluctuations in tempearture and analysis.

Selection of particle size of coke to be rejected by screening, for most economical and most satisfactory melting operations, is based on Table 1 and graph above. Due to the enormous change in square feet of surface area of a given weight for a coke of minus 2 in., it appears that this particle size meets both the above conditions.

More comprehensive discussions of the effect of coke size on cupola melting operations can be found in *"Foundry Coke: A Critical Study,"* AFS TRANSACTIONS, vol. 52 (1935) by B. P. Mulcahy, and in *"Blast Variations Seriously Affect Cupola Operations,"* also by Mr. Mulcahy, in the June 1948 issue of AMERICAN FOUNDRYMAN.

The coke screen was installed August 1949, and a hot blast was installed August 1950. Tables and graphs on this page show effects on operations.

Summary. It is apparent from the data that the use of a proper coke size for a given operation, together with careful handling and efficient coke screening, saves coke and limestone, increases the melting rate, and makes it easier to obtain maximum temperatures.

The author acknowledges with thanks the work of the following authors not mentioned above: *"Need Stronger Foundry Coke,"* talk by H. W. Lownie, presented before the American Coke & Coal Chemicals Institute, March 7, 1951, and *"Effects of Coke Sizing on Control of Cupola Melting Operations,"* Ford R. Snyder, Hickman, Williams & Co.

D. S. Eppelsheimer/*Professor, Metallurgical Engineering*
Missouri School of Mines and Metallurgy

D. S. Gould/*FEF Research Fellow*

Coercive Force: Possible Measure Of Degree of Malleablization

Graphitization of white iron can be measured magnetically according to this study of specimens provided by four commercial malleable foundries.

■ Coercive force is the magnetizing force necessary to reduce the retained magnetism of a previously magnetized sample to zero. It is an intrinsic property of a paramagnetic material. Coercive force can be affected by: gross composition, impurities, fabrication, heat treatment, temperature, and stress. It has been shown to be a function of carbon content in hot rolled plain carbon steels.[2] Coercive force increases with increasing carbon content.

It would appear logical that the matrix of an annealed white cast iron might be considered as a steel with decreasing carbon content, dependent on amount of graphitization, or as it will be subsequently called—degree of malleablization. The matrix of a completely malleablized white cast iron would therefore be expected to have the coercive force of ferrite and the matrix of a pearlitic malleable would be expected to have the coercive force of a eutectoid iron-carbon alloy. If the graphite nodules are considered only as voids with no appreciable effect on magnetic characteristics, it might be assumed that the coercive force of a malleable iron would be a function of the amount of combined carbon remaining in the matrix. This investigation was based on the foregoing assumption.

The coercive force measuring instrument used was the Bureau of Mines Model 2 coercimeter[3] shown in Fig. 1. This particular instrument requires cylindrically shaped samples 1½ in. long and ⅜ in. in diameter. A number of ⅜ in. cast rounds of com-

Fig. 1 . . Coercimeter used to measure degree of malleablization.

Fig. 2 (right) . . Experimental malleablizing cycle varied first stage graphitizing time but had same slow cooling cycle for all samples.

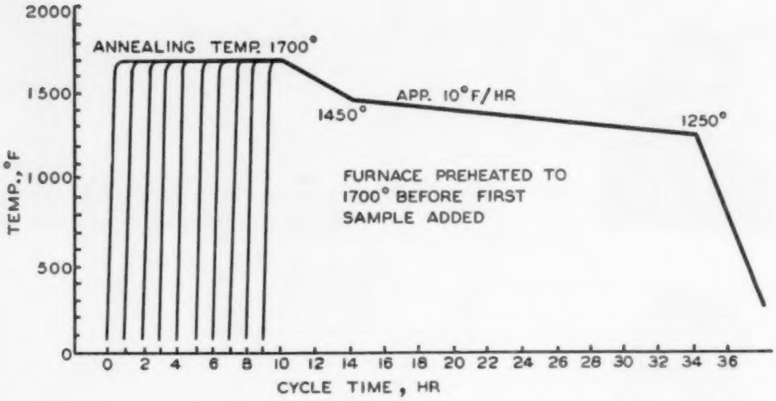
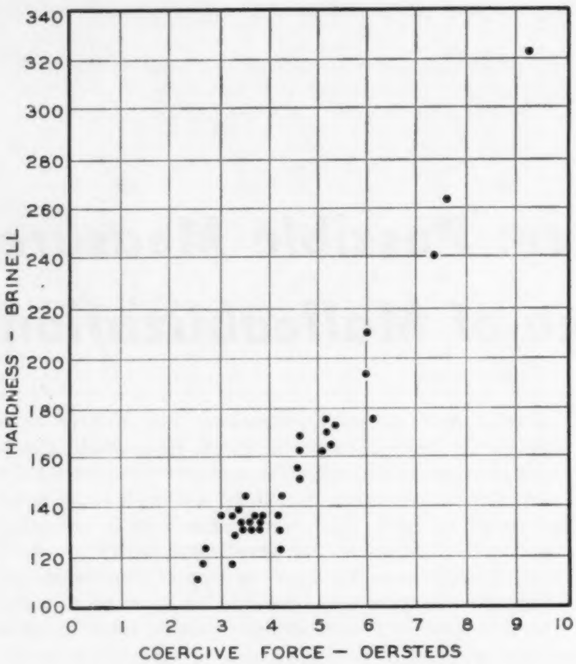


Fig. 3 (below) . . Hardness-coercive force relation of 35 random samples of malleable iron.



mercial composition were obtained from four malleable iron foundries. Chemical compositions were:

	A	B	C	D
Carbon, %	2.34	2.30	2.57	2.49
Silicon, %	1.65	1.28	1.05	1.04
Manganese, %	0.43	0.42	0.46	0.29
Sulphur, %	—	0.13	0.18	0.07

Bars were received in the as-cast condition and given special heat treatments to produce test samples which were incompletely annealed with varying amounts of pearlite, and in some cases massive cementite, in the matrix. The samples were protected against deoxidation during heat treatment and were given the same slow cooling cycle so that the only variable was first stage graphitizing time (Fig. 2).

After annealing, test samples were carefully sectioned from the 3/8-in. rounds. The samples were radiographed and although some showed internal defects, none was thrown out because of internal unsoundness. Coercive force and hardness measurements were made on each test sample.

Hardness determinations were made with Rockwell B because of the small sample size. The hardness value was based on the average of three Rockwell determinations, converted to Brinell for easy comparison. A plot of hardness versus coercive force for a number of random samples of all chemistry groups is shown in Fig. 3. It is felt that better correlation could have been obtained if Brinell hardness determinations could have been made directly.

The microstructure of the 3/8-in. rounds was examined. The photomicrographs (Fig. 4) show the change in coercive force with variation in microstructure. Chemical analyses of the combined carbon might also have correlated with coercive force.

The foregoing investigation was based on the assumption that the coercive force of the samples varied with the relative proportions of cementite and ferrite. It was assumed that cementite had a higher coercive force than ferrite and as the relative amount of cementite, as massive cementite and combined as pearlite, decreased in relation to the amount of ferrite, the coercive force of the alloy mixture also decreased.

To check this assumption, three samples known to have relatively large proportions of cementite with coercive forces values from six to 8 oersteds were treated according to the following procedure: The samples were heated to 500 F and air cooled to avoid any stress relieving effect in subsequent heating. They were then magnetized and the coercive force checked. Without being demagnetized, the samples were immediately heated to 500 F, a temperature above the A_0, and air cooled. (A_0 is the temperature at which the ferromagnetism of cementite disappears.) They were again checked for coercive force and the values were found to lie between 2.2 and 2.0 oersteds. This result would tend to validate the original assumption, in that the coercive force of the samples, after the retained magnetism of the cementite only had been destroyed, appears to be very close to samples containing little or no cementite.

Discussion: It would appear on the basis of the more or less preliminary data presented here, that the coercive force of malleable iron is a function of combined carbon, all other variables being constant. It does not appear to be affected by the internal soundness of the test samples. Although silicon content is known to affect coercive force, it would appear

that the small variations of normal practice would have no discernible effect on test result. The experimental samples of different chemical composition groups were compared separately and together. The 0.50 per cent silicon spread appeared to have little or no effect.

There appears to be practical application for the variations of coercive force with degree of malleablization. If the instrument could be redesigned so that coercive force, tensile and hardness determinations could all be made on the same sample, the technique described here for the determination of the degree of malleablization might have useful industrial application.

It is the authors' understanding that many foundries run pilot lots of tensile bars to adjust subsequent malleablizing cycles. It would appear that coercive force values from such a run would greatly enhance the reliability of assumptions based on such a pilot run.

Acknowledgement. Thanks are due Chicago Malleable Castings Co., Albion Malleable Iron Co., Wagner Malleable Iron Co., and Federal Malleable Co. for the test material used in this investigation. The Foundry Educational Foundation is thanked for providing the funds for the graduate fellowship which made this work possible. The authors would also like to acknowledge the original work of W. J. Ruprecht[4] who proposed some of rudimentary principles from which this work developed.

References

1. R. M. Bozarth, *Ferromagnetism*, (1951) p. 512. Published by D. Van Nostrand Co., Inc., New York.
2. R. S. Dean and C. Y. Clayton, "The Mechanism of Steel Hardening and Tempering as Indicated by Coercive Force Measurements," *ASM Trans.*, vol. 26, p. 237 (1938).
3. V. H. Gottschalk, "Development of the Coercimeter," U.S.B.M., R. I. 3400 (1938).
4. W. J. Ruprecht, "Physical Properties of Malleable Iron," MSM Thesis T984 (1951).

Sample: Group A
Hardness: 125 Bhn
Coercive Force: 2.7 oersteds

Sample: Group B
Hardness: 144 Bhn
Coercive Force: 4.3 oersteds

Sample: Group C
Hardness: 262 Bhn
Coercive Force: 7.7 oersteds

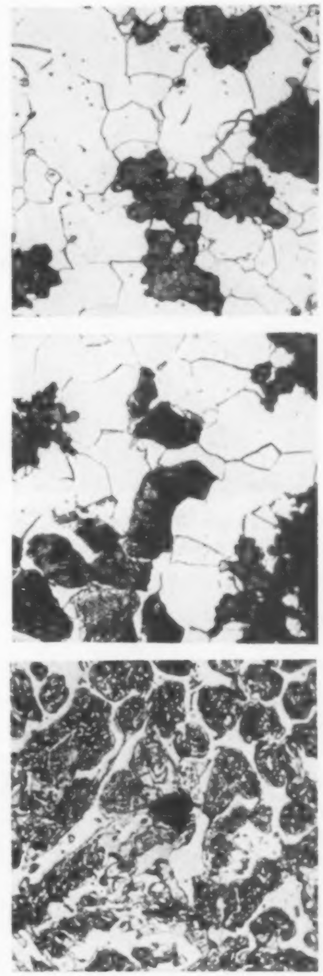


Fig. 4 . . Relation between microstructure, hardness, and coercive force of three malleable irons. Nital etch, 250X.

Here's How Neenah Foundry Co., Neenah, Wisc. installed Buda fork lift truck equipment for use on long and short hauls both within and outside the foundry building, moving rough and finished castings, materials and supplies and loading all trucks and rail cars of finished castings either loose or on pallets. Design features of the truck enables the company to considerably reduce any necessary repair time. *Buda Co., Div. Allis-Chalmers Mfg. Co.*

For more data, circle No. 693 on p. 17

Re-Melt Shell Casing Scrap

Three large stows of 5-in. 38 cal. brass shell cases awaiting melting and casting into usable slabs.

E. D. Boyle/*Master Molder*
Puget Sound Naval Shipyard
Bremerton, Wash.

Box pallets of shell casings are brought to melting site by truck and transported to furnace by fork lift.

Cartridge cases with primers and foreign scrap removed are charged by hand into induction furnaces.

More steel was thrown at Korea by the U. S. Navy than it fired during all of World War II. Disposal of 5-in., 40-mm, and 20-mm cartridge cases became a problem as transports returned them by ship load for storage at various Pacific Coast depots.

■ Until the installation for melting cartridge cases and casting billets for redrawing was set up at the Puget Sound Naval Shipyard, such work had always been done at the Naval Gun Factory. Puget Sound had three down-draft, oil-fired furnaces available for the project. Melting loss in these units was estimated at 12 per cent and, in addition, smoke and fume control would have been extremely difficult.

Two low-frequency induction furnaces were secured along with the necessary handling equipment to achieve maximum mechanization. Result was simplification of personnel requirements and maximum safety.

The furnaces are 150-kw, 460-volt, 60-cycle units. Each has a capacity of 1750 lb of molten brass of which 1200 lb is poured each heat. A spare furnace shell is on stand-by in case a furnace requires relining. A 60-kva voltage regulator with radial tap switch provides 460 volts for melting and six taps of lower voltage for holding (generally about 220 volts).

Current is supplied from a substation transformer. Control panels indicate voltage, amperage, and kilowattage. The 60-cycle alternating current passing through the primary coil of the furnace induces current in the secondary metal loop formed by the molten brass. The secondary current generates the heat for melting and superheating and causes circulation of the metal resulting in thorough mixing. Heat supplied is controlled by changing voltage and amperage. At 460 volts, the amperage varies constantly between 200-500 amp because bubbling of the molten metal through the secondary loop results in changes in resistance.

Approximately 150 kw are supplied during melting. During pouring, voltage is cut back to 220 to minimize bubbling and approximately 140 amp are supplied. During weekends the furnaces are kept full of melt; holding voltage is 175.

Mechanical handling facilities (see layout and pictures) include a monorail loop, a floor-level roller conveyor, a straight monorail, and several short lengths of roller conveyor and ball conveyor. The monorail loop carries the two sets of metal molds in front of the furnaces for pouring. It includes a drop section to lower the molds into a quenching tank. The floor-level roller conveyor handles cast slabs between molds and the straight length of monorail that handles slabs between the cooling area and the cut-off saw. A bridge crane and grab (not shown in layout) handle slabs between saw, banding table, and temporary storage.

The installation now operates around the clock on a five-day schedule, and between the middle of August 1953 and the end of June 1954 (first four months were shakedown period at less than capacity operation) melted and cast three million pounds of brass. Here's the step-by-step procedure followed:

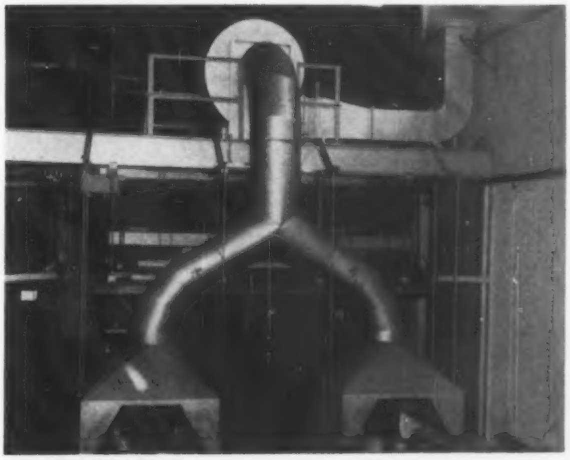
1. Shell case primers are removed at the storage area. In the case of small cartridge cases, any unfired primers are fired by baking in an oven. Foreign matter, such as steel is removed by hand.

2. Cleaned and deprimed cartridge cases are placed in wooden boxes of 120-cu ft capacity.

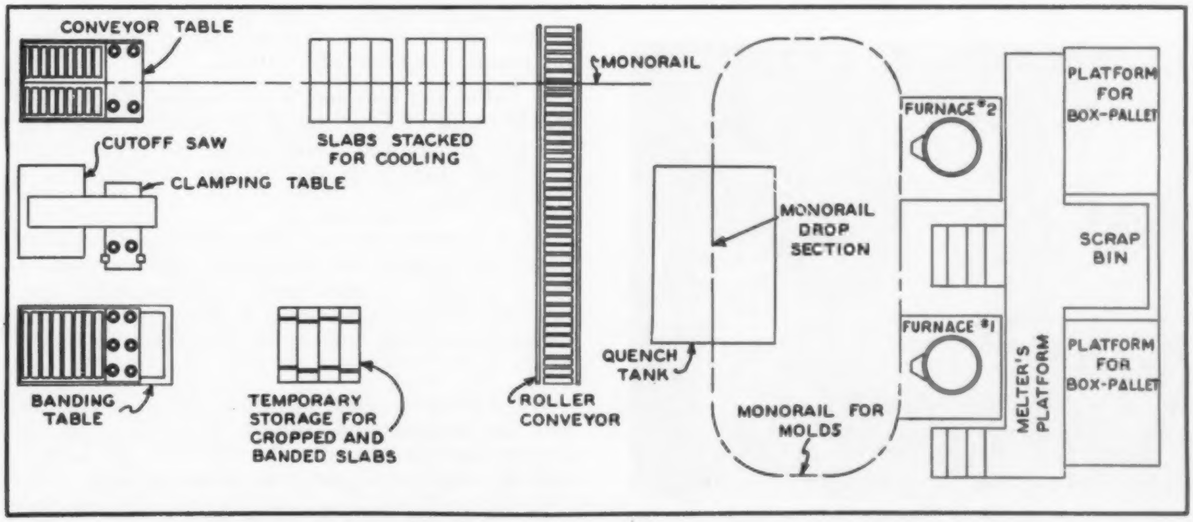
3. Four loaded boxes per truck are loaded by fork lift truck. Boxes are then trucked to the Puget Sound Naval Shipyard Foundry where they are unloaded by fork lift truck.

4. Furnaces are hand-charged. Melters check large shell cases to see that primers have been removed. Melting of a charge requires 65 to 80 min depending on the condition of the furnace. The melt is ready for pouring when the temperature, determined by immersion thermocouple, reaches 2060 F. Just prior to pouring, zinc is added to replace that lost by vaporiza-

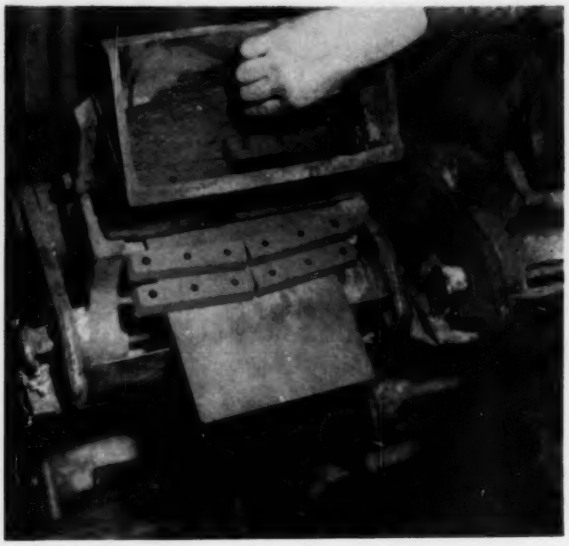
Melter checks metal temperature with immersion thermocouple at rear of furnace before pouring.



Exhaust system is shown in rear view of furnace and casting area. Monorail system is in background.



Floor layout of cartridge brass slab casting operation at Puget Sound Naval Shipyard.



Upper left . . . Gate strainer core segments are inserted in pouring basin. Above . . . Chemical analysis of each heat is made on chill mold specimens.

Melter at right tilts furnace hydraulically. Helper catches overflow of metal from each pour.

Train of four molds is lowered into quench tank by electrically operated drop section of monorail.

tion. The following schedule is followed for the amount of zinc added:

SIZE OF SHELL	ZINC ADDED PER CHARGE	CHARGE HELD OVER WEEKEND
Under 40 mm	none	1 lb
40 mm	3 lb	4 lb
3, 4, 5 in.	6 lb	8 lb
6 in.	8 lb	10 lb

Prior to pouring, the melter pours a test ingot.

5. Melter removes slag with a skimmer bar prior to pouring.

6. Helper positions first of a train of four molds for pouring. This is done by towing the train around the closed monorail track by means of a monotractor.

7. Melter tilts furnace and pours. Tilting is accomplished by a hydraulic double-ram tilting mechanism. Helper catches any overflow in a metal bucket. Pouring requires approximately 4 min.

8. After the four molds are poured, the train is moved to the drop section of the monorail loop. The overflow trough and splash guards are removed and any brass sticking to the outside of the molds is chipped loose.

9. The rolling cover for the quench tank is pushed back and the molds are lowered into the water quench. Water and air are turned on for agitation and to keep the water temperature below boiling. Quench water temperatures range from 60 to 175 F. Quench time is 3 min.

10. Following quenching, the molds are raised and the quench tank covered. The molds are undogged, and the hinged mold cover brought to floor level by means of a 1600-lb fixed electric hoist.

11. A helper pulls the slabs from the molds onto a roller conveyor by means of a hooked bar.

Above . . . Helper pulls brass slabs from open molds onto roller conveyor. **Upper right** . . . Mold coating is lard oil and graphite, two to one by volume.

12. All four slabs are then pushed along the roller conveyor into position for pick-up by the monorail air hoist and removal to cooling area. The slabs are stacked in layers of four with 2 x 4's between layers to permit circulation of air. The slabs are marked by chalk to indicate heat number. The test ingot is stamped with the same heat number.

13. Loose graphite is removed from the molds by brushing. A disc sander is used when the graphite becomes baked onto the mold surface.

14. The molds are coated with a mixture of two parts lard oil and one part graphite by volume prior to closing.

15. Molds are closed, then dogged, pouring basins are swung into place, strainer cores are inserted in the pouring basin, and the splash guard hooked into place. The train is then ready for the next heat. Two trains of four molds are used.

16. When the slabs are cool, each layer of four is picked up by the monorail air hoist and placed on the conveyor table adjacent to the cut-off saw. The slabs are fed into the clamping table by hand, clamped in place by air cylinders, and the rough end sawed off. The sawing operation for each slab requires about 10 sec. The chipper who does the sawing unclamps the slab and slides it over onto a table with ball rollers.

Two men lift the slab by means of a grab and the bridge crane and position it on the banding shelf. Four slabs are stacked, banded, and placed on a pallet. Each pallet holds four banded stacks. All four stacks are then banded to the pallet itself. Heat numbers are stamped into the sawed ends of each slab.

17. The palletized slabs are forklifted to interior storage. When a railroad flat car becomes available, the palletized slabs are moved outside the building and loaded.

Special grab and monorail air hoist are used to move cooled slabs to the cut-off saw.

Slabs are cropped on cut-off saw loaded from combination roller and ball conveyor table at right.

M. E. Annich / *Director, Industrial Engineering*
American Brake Shoe Co., Mahwah, N. J.

Anybody Can Simplify Work

Principles of work simplification and a methodical, rational approach to their application are given in this chapter from the new AFS book *Time and Motion Study for the Foundry.*

■ The principles of work simplification are not new. The fact that these principles have been known and applied in industry in the last half century, especially here in the United States, is documented by the vast and rapid growth of our industrial age, and the ever increasing standard of living which we enjoy.

As a simple but fundamental example of this we can point to the steel industry. Years ago when they first started rolling strip and plate, it was natural to use only two rolls. These were heavy and ponderous, and their driving mechanism had to be stopped and then reversed, after each pass of the billet or strip, to roll it back again. This had to be done when the element of time was at a premium in order to work the steel while it remained within the workable temperature range. Production was slow and costly, and it was impossible to make the smaller sizes and thinner sections by this method because of the time and temperature factors.

Then someone got the bright idea (work simplification, if you will) of adding a third roll so the strip could be fed back through the rolls by the simple expedient of running it back under the middle roll. Production was stepped up tremendously, and the range of strip that could be produced by the new method was considerably broadened.

Times Have Changed

It is a far cry today from the old type mill with three rolls and hot strip to the present continous mills and cold rolling. But every step of the way has no doubt been made possible in some degree by the greater production, the lower costs (and consequent greater profits), and the wider variety of work that could be produced by the simple addition of that third roll to the original two-roll mill. This is a concrete example of work simplification.

However, the term *work simplification* as it is used today implies something more than just the principles involved. It embodies not only the principles themselves, but a methodical and rational approach to the problem of applying those principles, which can be practiced universally. And by that is meant by everybody in the plant (or office) from the sweeper to the company president.

Many plants and many companies have tried or are trying suggestion systems with varying degrees of success. Reasons for failure are many—poor administration; niggardly awards; lack of publicity; apathy on the part of employees; and just plain downright poor labor or human relations.

Give Them the Tools

But there is one other cause for failure of suggestion systems. We are asking the fellow in the shop to do a job and we are not giving him the proper tool to do it—work simplification. Here again is meant not only the principles but the method of approach and analysis as well.

Ideally then, carrying work simplification to the ultimate would mean training everybody in the plant to use the principles and the method of analysis, and tying it in with an adequate, fair, and rewarding suggestion system. Much could be done for labor relations under such a program.

However, we must be realistic. We must learn to crawl before we can walk. The idea of training in work simplification for everybody is still too radical a step, and must await a time in the future when the labor-management team really functions as a team.

To be practical, then, we must aim our program at the supervisor. He, as an integral part of management and a person above average in intelligence and ambition, and in direct contact with actual shop practices and conditions, is the logical man to train in

work simplification. This discussion, therefore, and the forms and examples of their use, is presented from the standpoint of putting on a foreman training program on the subject. This has been done in several plants of the writer's company, and we intend to do much more. We still have a great deal to learn, and hope to improve and make the program more effective each time. But we already have learned considerable about what to do and what not to do. It is hoped that this discussion will bring out some of the more important points.

Why is work simplification so important at this time, and why is it being stressed more and more by industry today?

First, with the pressure of controls, both price-wise and material-wise, and the increasing pressures of wages, material costs and taxes, the 'take-home' profit margin is bound to shrink. The only way left to combat the trend is in improved methods and increased productive efficiency—for which there is no better answer than work simplification.

Second, many plants and companies have already installed incentive wherever possible and have realized all the benefits they can from such installations. Now it becomes imperative—to meet the shrinking profit margin—that they go back over the same ground and dig out the additional savings which can be realized by improved methods which were not obtained in the hurry and pressure of making the original incentive installations.

Third, some plants and companies, under the conditions they face today, cannot make incentive installations. To these, work simplification and methods improvement is the obvious answer.

And fourth, from a broad point of view, if America is to remain strong, combating inflation and affording a constantly rising standard of living for everyone, production and more production is the answer. Work

Table 1. . Five Steps to Job Improvement

1) Pick a job
   a) One that is worth improving
   b) One that is giving trouble, because:
      1) It is a bottleneck
      2) It takes too much time
      3) It requires looking around for material, tools, supplies, etc.
      4) Costs are too high
2) Observe the job:
   a) Break down the job into its details or elements
   b) Write down on paper the details or elements
3) Think! Question every detail or element:
   a) Why is it necessary? What is its purpose?
   b) Where should it be done?
   c) Who is best qualified to do it?
   d) When should it be done?
   e) How can it be done a better way?
   f) Question product design, material, etc.
4) Decide! Work out the new method:
   a) Eliminate unnecessary details.
   b) Combine elements where practical.
   c) Rearrange elements for better sequence.
   d) Simplify details or elements.
   e) Look for waste and bottlenecks.
   f) Discuss your ideas with others, and ask questions.
   g) Write up your suggestions.
5) Act! Sell the new method and apply it:
   a) Sell it to the boss.
   b) Sell it to all others concerned.
   c) Get final approval.
   d) Put the new method into effect until a better way is developed.
   e) Give credit to others where credit is due.
   f) Don't forget, a change of method means a change of standard or piece price; otherwise the savings on your new method are lost and will also result in a loose rate.

Table 2. . Twenty Principles of Motion Economy

In the search for the "one best way," check each job against the list of principles shown below to see what changes may be made to improve the method and reduce the fatigue.

1) Begin each element simultaneously with both hands.
2) End each element simultaneously with both hands.
3) Use simultaneous arm motions, in opposite and symmetrical directions.
4) Use hand motions of lowest classification for satisfactory operations.
5) Motion path must stay within normal working area.
6) Avoid sharp changes of direction by planning a continuous curved motion path.
7) Slide small objects instead of pick up and carry.
8) Locate materials and tools in proper sequence, at fixed work stations.
9) Fewest elements usually mean shortest time.
10) Rhythm and automaticity lessen fatigue and increase output.
11) Foot pedals should relieve hands where possible.
12) Avoid holding. Use vise or fixture, freeing hands to move pieces.
13) Provide ejectors, foot operated, to remove finished pieces.
14) Drop delivery should be used where possible.
15) Bring work close to point of use by gravity feed hoppers to shorten transport.
16) Pre-position tools for quick grasp.
17) Pre-position product for next operation.
18) Locate machine controls for ease of operation.
19) Design workplace height for sitting-standing arrangement and provide proper height chair with comfortable seat and back rest for good posture.
20) Provide pleasant working conditions, considering illumination, temperature, humidity, dust, fumes, ventilation, noise level, color schemes, orderliness, etc.

Fig. 1. . The job is analyzed on a simplified sheet.

FLOW CHART DATE

JOB__________ OLD METHOD ☐ NEW METHOD ☐

__________ OBSERVED BY______ PAGE____ OF____

STEP NO.	DESCRIPTION OF EACH STEP WHAT-WHERE-WHEN-WHO-HOW	TIME IN MINUTES: OPERATION ○	TRANSPORT ⇨	INSPECTION □	DELAY D	STORAGE ▽	DISTANCE IN FEET

FLOW CHART SUMMARY DATE______

JOB______ PAGE___OF___

OBSERVED BY______

	OLD METHOD		NEW METHOD		DIFFERENCE	
	NO. STEPS	TIME-MINUTES	NO. STEPS	TIME-MINUTES	NO. STEPS	TIME-MINUTES
OPERATIONS						
TRANSPORTS						
INSPECTIONS						
DELAYS						
STORAGES						
TOTALS						
DISTANCE TRAVELLED	FEET		FEET		FEET	

POSSIBLE SAVINGS:

REMARKS:

Fig. 2. . The flow chart summary sheet is compiled from the job analysis flow charts.

simplification can help materially to accomplish this objective.

Methods and job improvement can be done without expensive outlays for mechanization and capital equipment. The total of all the small savings that can be made in a plant set-up, without extensive, or expensive changes in physical layout or equipment, can far outweigh the savings that might accrue from a major mechanization program.

Work simplification can be practiced by anyone. There are experts who can look over a situation and come up with the right answers to make savings and reduce costs almost immediately. Such experts are few and far between, and they come high. With work simplification, if the proper approach and method of analysis is used, anyone of average intelligence can come up with the answer for a better way to do a job.

The proper approach and method of analysis involves the mere following, one step at a time, of the five fundamental steps to job improvement. These are outlined in Table 1. In following these steps, various well-known principles, formulated by the pioneers of industrial engineering and proven over the years, must be applied (Table 2).

The focus of the questioning attitude must be turned on the job under consideration, not as a whole but in its detail, taking only one element in the job at a time.

To follow the five fundamental steps to job improvement, to apply the principles of motion economy, and to focus the questioning attitude on each element in a job in a methodical manner, the following work-sheets are used:

Figure 1 is a simplified type of flow chart on which the job may be analyzed.

Table 3 is an explanation of the flow chart symbols.

Figure 2, the flow chart summary sheet, which is used to do the selling job on the proposed method, is really the meat of the program. It is senseless to spend time and effort analyzing a job working up an improved method, if a slipshod and half-hearted attempt to present the possible savings and advantages to be gained dooms the acceptance of the proposed method in the first place.

Figure 3 is a job analysis worksheet for simplifying the questioning of every element, and jotting down pertinent notes, ideas and questions as they occur.

Tables 4 and 5 represent another type of worksheet for focusing the questioning attitude on the job, with space also afforded for making notes.

No program of training in work simplification will be successful if a man does not work at it. Merely giving a man a book or an article on the subject and having him read it is a waste of time. Each man in a training program must be required to go through the five steps.

After a sufficient number of introductory meetings, in which the subject is thoroughly explained, each man is assigned a project (usually one of his own choosing, and with which he is familiar). He then actually goes through all the steps. Subsequent sessions can be devoted almost entirely to discussions of each man's project in turn. Conference discussions bring out worthwhile ideas. The worth of the new methods resulting from such a program and the possible savings on all of the projects submitted—if the program is conducted conscientiously—should be proof

Table 3. . Flow Chart Symbols and Definitions

Flow Charts Can Be of Two Types

1) **The MATERIAL type which presents the process, or flow, in terms of the events which occur to the material.**
2) **The MAN type which presents the process in terms of the activities of the man.**

***OPERATION*. . Symbol : An operation occurs when an object is intentionally changed in any of its physical or chemical characteristics, is assembled or disassembled from another object, or is arranged or prepared for another operation, transportation, inspection or storage. An operation also occurs when information is given or received or when planning or calculating takes place.**

***TRANSPORTATION*. . Symbol : A transportation occurs when an object is moved from one place to another, except when such movements are a part of the operation or are caused by the operator at the work station during an operation or an inspection in a material type flow chart.**

***INSPECTION*. . Symbol : An inspection occurs when an object is examined for identification or is verified for quality or quantity in any of its characteristics.**

***DELAY*. . Symbol : A delay occurs to an object or a man when conditions, except an operation, transportation, inspection or planned storage, do not permit or require immediate performance of the next step in the process.**

***STORAGE*. . Symbol : A storage occurs when an object is kept and protected against unauthorized removal (planned storage).**

When unusual situations outside the range of the definitions are encountered, the intent of the definitions summarized in the following tabulation will enable the analyst to make the proper classifications.

CLASSIFICATION	PREDOMINANT RESULT
Operation	Produces or Accomplishes
Transportation	Moves
Inspection	Verifies
Delay	Interferes
Storage	Keeps

WORK SIMPLIFICATION – JOB ANALYSIS WORKSHEET

JOB ______ OBSERVER ______ DATE ______ PAGE ___ OF ___

← OBSERVE →	← THINK		QUESTION EVERY DETAIL →			
BREAK DOWN THE JOB & LIST ALL OF ITS ELEMENTS OR DETAILS	WHY IS IT NECESSARY? WHAT IS ITS PURPOSE?	WHERE SHOULD IT BE DONE?	WHO IS BEST QUALIFIED TO DO IT?	WHEN SHOULD IT BE DONE?	HOW CAN IT BE DONE A BETTER WAY?	QUESTION PRODUCT DESIGN, MATERIAL ETC.

Fig. 3. . The job analysis work sheet is used for questioning the work elements and noting details as they occur.

enough to all of the value of work simplification.

Further, to merely go through a training program once—and then expect miracles in the way of new methods and savings to continue to flow from the group, is plain wishful thinking. If the benefits of work simplification are to be fully realized, and to continue to be realized, a definite follow-up program should be initiated and religiously adhered to.

One man should be made responsible for the follow-up program. Meetings should be held periodically (about once every two months), and each man should be required to submit a new project at each meeting for discussion and ultimate approval.

A record should also be kept of the projects submitted, the possible savings, those approved and put into effect with the realized savings, and last but not least, the reasons for each project not approved should be adequately explained to its author and written up in the record for future reference.

Such a record, which should be submitted to top management periodically, will prove that a work simplification program, when properly conducted, pays off. This will make it progressively easier for the group to sell its ideas to top management, even when it means some capital outlay for equipment or a change in physical layout.

Table 4. . Standardizing the Job

Date ______

Job ______ Observed by ______

______ Page 1

EXPLANATION AND REMARKS

MATERIALS

Can cheaper materials be used? If so, what?
Is the material of proper size to keep the amount of waste, scrap, short ends, etc., to a minimum?
Is the material uniform, and in suitable condition for use when brought to the operator?
Does the operator use this material to the best advantage during the process?
Can some use be found for scrap or rejected parts?

MATERIALS HANDLING

Can the distance material is moved be shortened?
Can the number of times material is handled be reduced?
Is the material received, moved and stored in suitable containers?
Does the volume of material flow justify a conveyor or other means of transportation?
Will a rearrangement of the layout or combining of operation make it necessary to move the material?
Can backtracking be reduced or eliminated?

TOOLS, JIGS AND FIXTURES

Are the tools the best for the job?
Are tools kept in good condition?
Does the operator have trouble setting the work in the jig or fixture? In setting certain cores, etc.?
Are tools and material arranged within the normal work area and conveniently at the workplace?
Can tools or fixtures be changed to require less skill in performing the operation?

Table 5. . Standardizing the Job

Date ______

Job ______ Observed by ______

______ Page 2

EXPLANATION AND REMARKS

MACHINE

Are drawings, tools, patterns, cores and other job accessories brought to the workplace without delay?
Is the machine properly set up?
Does the operator make his own set-up? If so is it on incentive when the job is on incentive?
Are there delays in the inspection of the first piece produced?
Can the number of set-ups be reduced by proper lot sizes or better scheduling?

OPERATION

Is the operation necessary? Can it be eliminated?
Can two or more operations be combined into one?
Can the work be done in multiple?
Can the machine speed or feed be increased?
Could a jig or fixture be used to advantage?
If a hand job can it be put on a machine to make it more economically?

OPERATOR

Is the opeartor qualified to do the job?
Can unnecessary fatigue be eliminated by changing tools, fixtures or layout?
Is the supervision satisfactory?
Can the operator's performance be improved by further instruction?

WORKING CONDITIONS

Are light, heat, ventilation satisfactory?
Are there unnecessary hazards on the job?
Can a chair or stool be used to perform the job more efficiently? With less fatigue?
Is good housekeeping maintained in the department and around the workplace at all times?

By Direct Mail...

Foundry Hits Selective Market

Harold Brown / *Sales Manager, Industrial Castings*
Hunt-Spiller Manufacturing Corp., South Boston, Mass.

Orders received as a direct result of a direct mail promotion already total three times the cost of the mailing. And most are expected to be repetitive. The article is also appearing in *Sales Management*.

■ A two-step direct mail program was successfully used by Hunt-Spiller Mfg. Corp. to capitalize on the selectivity of their market. Hunt-Spiller is a large manufacturer of iron and steel castings for railroad, automotive, and commercial applications. The railroad and automotive markets are national in scope and covered by national advertising in appropriate trade magazines whereas the commercial casting market is almost solely contained in the New England area.

Since a potential commercial casting customer can usually be determined by the statistics in any good industrial directory, it was decided that a direct mail campaign would be the best medium to use to achieve the objectives of the commercial advertising program.

The mailing attempted to achieve three distinct objectives with the use of lists compiled from the New England industrial directory plus additional names supplied from the sales department. The first and primary objective was to help get across to present and hard-to-sell customers the value to them of a new foundry expansion and modernization recently completed. This was to supplement the efforts of the representatives along these lines

HUNT-SPILLER MANUFACTURING CORPORATION
South Boston, Massachusetts

Request to:

For the Survey Information Indicated Below:

Because we're writing to just a few selected firms, your individual replies to the following questions are important to us. It should take only a few moments to complete the questions as they require merely a check mark.

---

1. Are you familiar with Hunt-Spiller's reputation as a maker of high-quality specialty castings? __ Yes __ No
2. Did you know that as a result of our recent foundry expansion and installation of fast changeover Molding Machines:

   We can now furnish certain castings at substantial savings weighing from 50 to 500 lbs. per flask, in lots of 15 and over? __ Yes __ No

   We can now pour electric steel castings up to 5000 lbs... and iron castings weighing 7000 lbs. ? __ Yes __ No
3. Did you know that because of its superior resistance to frictional wear, heat, pressure, corrosion and erosion - Hunt-Spiller's exclusive Gun Iron is widely used for valves, cylinders, cams, rings, gears, housings, compressor type castings and many other industrial applications? __ Yes __ No
4. Did you know that Hunt-Spiller also casts other irons such as High Carbon, "L. C.", Ni-Resist, Ni-Hard, Minovar and Ductile Iron? __ Yes __ No
5. Were you aware that every Hunt-Spiller Casting is metallurgically controlled from start to finish to assure dense 100% pearlitic structure? __ Yes __ No
6. The Hunt-Spiller Metallurgical Laboratory is considered one of the finest in the country. Do you ever recall reading or hearing about this before? __ Yes __ No
7. Did you know that Hunt-Spiller has a complete, modern machine shop for efficient finishing of foundry products? __ Yes __ No
8. Would you be interested in receiving further information on a foundry:

   __ Where quality castings are produced inexpensively, making possible substantial savings?

   __ Where you can always get specified materials - either rough cast or machine finished - in castings that are dimensionally uniform and structurally sound?

Thank you very much for your cooperation! After checking your answers, just return this sheet in the stamped, addressed envelope enclosed.

and make it easier for them to gain customer cooperation in selecting the type of work which would result in savings to the customer.

The second objective was to stimulate interest, preferably in the form of inquiries, from previously unsolicited customers who might be embarked upon a program which would use castings but whose size would not ordinarily justify the expense of a personal call. By ferreting out special situations where Hunt-Spiller's products and services might best be needed with this type of customer, the mailing was to enable sales effort to be directed with a minimum of expense and maximum of potential value.

request further information on castings which would result in savings to him. An answer to this question resulted in the immediate mailing of a 24-page booklet entitled "Furnace to Foundry to Finishing" and this in turn was followed up by a personal call.

Three weeks after the first mailing a second letter was sent to all previously unsolicited and hard-to-sell customers who had either not returned the questionnaire at all or who had returned the questionnaire but had not requested further information. This was an essay type letter which offered the 24-page illustrated booklet. A brief description was given of the information contained in the booklet and how savings could be effected on certain types of castings as a result of the recent modernization program.

ond mailing, what action had been taken, and finally, the results of this action.

The degree of response to the mailing can be seen below:

	NO. SENT	RE-SPONSE	PER CENT
First Mailing	717	158	22
Second Mailing	497	50	10

The volume of orders already received as a direct consequence of the mailing total approximately three times the cost of the mailing. As the majority of casting work is of a repetitive nature the value of these orders is actually much greater. A healthy number of leads is also available with regard to desirable business previously unsolicited.

Questionnaire used in initial mailing to prospective customers brought 22 per cent response.

Colorful 24-page, 8½ x 11 in. brochure shows background and typical facilities and products of Hunt-Spiller. Company dates back to 1810; early order was for cast cannon balls for War of 1812.

The third purpose was to keep the name of Hunt-Spiller, its products and services, continually in the mind of all possible customers of irons and steel castings while at the same time, the mailing would maintain or enhance Hunt-Spiller prestige with satisfied customers of both recent and long-time standing.

It was decided that a multiple step mailing would be the most desirable to achieve these objectives.

The first mailing was a questionnaire addressed to either the purchasing agent, chief engineer, or both. It consisted of eight questions, the first seven of which informed the reader of the recent modernization and expansion program, and the products and services offered by Hunt-Spiller. The eighth question suggested that the reader

A self-addressed card was enclosed in the mailing and the recipient merely had to fill it out and drop it in the mail box to receive the booklet. All requests for the booklet from this mailing were immediately filled and followed up with a personal call.

The record and progress of the mailing was kept in several large notebooks which included all the names of the original lists. The books were categorized by state with the names listed alphabetically. Columns to the right of the names were used to indicate who had responded to the first and sec-

Despite the ordinarily long time lag between initial contact and placing of order, past experience would indicate that a certain percentage of this potential can and will result in future orders. In addition, the representatives feel that the mailings have supplemented their efforts and helped secure customer acceptance of the cooperation required of them to gain optimum value from the modernization program.

In view of the successful accomplishments of this program, plans are being laid for regular quarterly mailings utilizing current developments and customer savings effected through the use of certain Hunt-Spiller iron and steel castings.

Morris Gittleman / *Metallurgist, Pacific Cast Iron Pipe & Fitting Co., South Gate, Calif.*

System Sand Control

in a west coast pipe foundry

Setting up and controlling a system sand requires a nice compromise between sand properties, equipment, and economy. The author outlines the general problem and tells how it was solved in his plant.

■ Control of foundry system sand usually begins in the core room. Sand from the cores enters and mixes with the system sand and becomes the molding sand. If cores at the shake-out do not add sufficient sand to balance the normal losses, new sand has to be added to keep the system storage bins at the desired levels. Control is more difficult when new sand has to be added. Whenever practical, a continuous production sand system should be complemented with enough cores to furnish sufficient sand to balance routine losses of molding sand.

In discussing a system sand, the author is using as an example, a sand used for pipe fittings ranging in weight from 1 lb to 22 lb and generally $\frac{5}{32}$-$\frac{7}{32}$ in. thick. The average composition of the metal is: C, 3.35 per cent; Si, 2.40; Mn, 0.63; P, 0.45; and S, 0.11 max.

In designing a core sand destined to be the molding sand of the system, consider the following points:

1. The sand must make a satisfactory core which implies a minimum performance standard in workability, baking, and finally in the mold.

2. The sand is in reality molding sand that is capable of functioning temporarily as a core sand, and must therefore work well as a synthetic molding sand.

3. The sand or combination of sands selected should be that which can produce a ton of good castings most economically, not omitting core costs. This cannot be determined abstractly but can only be arrived at when all the relevant possibilities have been explored and put to test in actual practice.

Section of Pacific Cast Iron Pipe & Fitting Co. core room. Core sand is a half-and-half mixture of two Nevada sands. All production cores are blown.

Core sand used by Pacific Cast Iron Pipe is a 50-50 mixture of two Nevada sands (Table 1). All production cores are blown; approximately 75 per cent go into driers, about 25 per cent stand up.

Mixes used are:

	TRANSFER DRIERS	STAND UP
Moapa Valley Sand, lb	250	250
Fire Valley Sand, lb	250	250
Corn Flour, lb	2	2½-3½
Core Oil, qt	4	4
Moisture, %	2.0-2.5	2.5-3.0

In stand-up core mixes, 5 qt of corn flour are used where stand-up stresses are well balanced and where blower box design demands good flowability; 7 qt of corn flour are used where there are projections on the core or where stand-up requirements for greater green strength compel a sacrifice of flowability. For conditions in between, 6 qt of corn flour are used.

After being screened and measured, core sands are dumped into a hopper to which corn flour is added. This is raised and emptied into a muller into which required volumes of water and core oil are metered during the mulling operation, which proceeds on an established cycle. The mulled sand is dumped into a wheelbarrow and distributed to the various hoppers which feed their respective core blowing machines located a floor below. A belt conveyor which passes along these core blowing stations, takes the green cores to a tower oven, in which they are baked at controlled temperatures of 450-470 F.

In preventing stickiness, promoting good workability, and maintaining low core room scrap (less than 1 per cent), there is no substitute for good sand and foundry practice. The following factors are dominant:

1. Screen and measure (by weight or volume) all sands.
2. Make routine screen analysis tests to check on the uniformity of the grain fineness and distribution of incoming sands.
3. Keep core room equipment accurate and in good operating condition.
4. Use the simplest mixture that will develop a core with adequate properties (and not much more) under controlled mixing conditions.
5. Maintain a uniform practice.

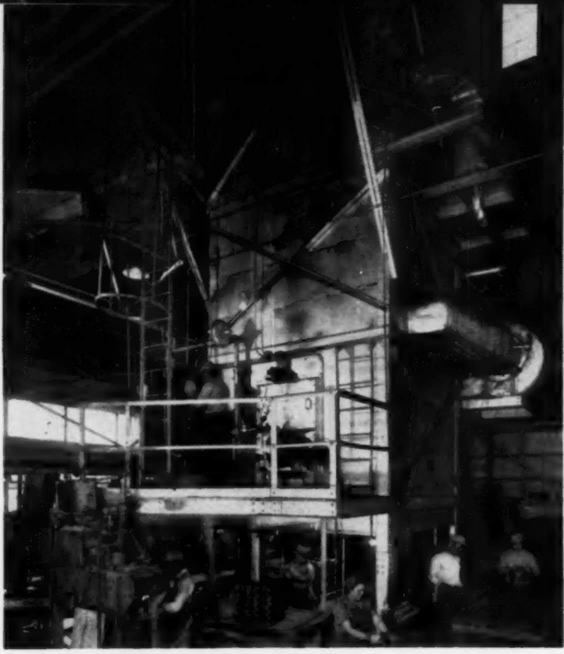
Table 1 . . Screen Analysis and Composition of Core Sand

	Percentage Retained		
Sieve No.	Fire Valley	Moapa Valley	Fitting System
6	—	—	—
12	—	—	—
20	—	0.2	0.2
30	0.2	0.6	0.4
40	1.2	9.0	4.0
50	9.6	24.4	19.6
70	24.2	26.2	21.6
100	32.4	20.2	22.2
140	21.6	12.2	17.4
200	8.6	5.6	6.0
270	1.2	1.2	0.4
Pan	1.0	0.4	0.4
AFS Fineness No.	78	63	69
AFS Clay Content, %	—	—	7.8
Grain shape	Sub-angular to round		
SiO_2, %	97.02	96.62	
Fe_2O_3, %	0.19	0.18	
Al_2O_3, %	1.41	1.40	
TiO_2, %	0.05	—	
MgO, %	0.12	0.66	
CaO, %	0.09	0.14	
Na_2O, %	0.04	—	
K_2O, %	0.66	—	
Loss on Ignition	0.42	0.97	

The trend in the core room has been generally to use a coarse sand (30-50 AFS fineness) with a narrow grain distribution (2-3 screens), the reasons being: fast baking, good flowability, lower oil consumption, and ease of venting. Such coarse sand with two or three screen distribution, however is not suitable for modern production molding. Consequently, it becomes necessary to make appropriate adjustments, usually by adding one or more complementary sands at the shake-out or muller in order to secure a desired grain distribution. This is costly, difficult, and at best makes control erratic.

A good, refractory 4-screen sand which can serve a dual purpose in both cores and molding is to be preferred in a modern sand system. This is especially true on the Pacific Coast, where the freight cost of good eastern silica sand is in many instances several times the price at the supplying city. Then too, a

Jolt-squeeze molding line for cast iron fittings. Approximately ten tons of sand are required to produce one ton of castings on a scrap-free basis.



Above . . Checking permeability in sand test lab.

Left . . Cores are baked in tower core oven.

finer core sand gives less box erosion, less metal penetration, as well as better finish.

From the shake-out, the combined molding and core sand passes into the storage bin. Two 50-ton sand storage bins feed two mullers. To each muller batch of 1400 lb sand is added 1¾ lb southern bentonite, 1¾ lb western bentonite, 1 lb of proprietory facing material (sea coal substitute), and water to desired moisture content. All components entering the muller are carefully measured. The mullers, each alternately discharged, run on a 3-min. cycle: one minute dry, while the bonds are added, and two minutes wet. At a 7.2:1 sand-metal ratio with a 27 per cent allowance for gates and sprues, it takes approximately 10 tons of molding sand to produce one ton of castings on a scrap-free basis. Taking an over-all yield of 68 per cent, gives $1.38 as the approximate cost of the molding sand used to produce one ton of good castings.

The molding sand develops the following physical properties:

	MULLERS	HOPPERS
Permeability	55-65	60-70
Green Compression, psi	9.0-11.0	10.0-12.0
Moisture, %	4.2-4.5	3.9-4.1
Hardness	82-86	85-90
Dry Shear, psi	25.0-30.0	20.0-25.0

The mechanical system that stores and conditions, this sand should deliver to the molder's hopper an adequate supply of reasonably cool, well-conditioned sand. For the operation described, sand below 110 F is preferred. Beyond that temperature excessive moisture loss, stickiness, and poor workability are generally encountered. The system should keep a desirable grain distribution as well as maintain uniform physical properties. The sand system should be designed with simplicity, adequacy, and economy foremost in mind.

Over-mechanization can yield diminishing returns economically. Assume, for example, that the foundry has a hot sand problem. This can be remedied by an elaborate installation, consisting of a cooling tower. baffles, conveyors, drives, electronic controls, etc. However, a more suitable sand to metal ratio, plus a shorter time interval between pouring and shake-out, plus an increase in sand cooling by improvement (if possible) of present facilities—may prove satisfactory for all practical purposes and much more desirable costwise than the elaborate equipment.

What may be over-mechanization in one plant may well be sound economy in another. The cost per ton of good casting should be the guide to prudent foundry management in determining whether any piece of equipment or installation is desirable. Wisdom dictates that full use be made available equipment and facilities, before embarking on charges, renovations, and expensive installations.

The sand to metal relationship should be checked periodically. By weighing a complete complement of molds on the production line of the system before and after pouring, the sand (molding plus core) to metal ratio can be readily established. Once the total weight of the metal that goes into the molds is known, the weight of the gates and sprues, as well as the weights of the scrap and good castings should likewise be obtained. This furnishes sufficient data for deriving the gating percentage and the good casting yield. These ratios including the sand to metal ratio are significant and useful to quality control. It should be emphasized that uniformity begins with measurement and control of component parts of a system.

The storage bins, dust collectors, mullers, belts, magnetic pulleys, elevators, aerators, plows, hoppers, shake-out, and mold conveyors are all related to quality control to the extent that their design and operation maintains uniformly the desired range of sand properties or fails to do so. A storage bin that pipes, a dust collector with plugged pipe, improperly set pressure fingers in an aerator, missing or loose buckets on elevators, improperly set plows on distributing belt, poor hopper design, too light or too severe shake-out, mold conveyor moving too fast or too slow, muller plows set too high, are all simple examples of how sand uniformity depends upon the maintenance of a methodical operation.

As an example take a storage bin that pipes. Sand

turnover becomes more rapid, because an appreciable amount of sand is removed from circulation as a result of piping. Consequently the sand that remains has to be used more frequently. Furthermore, the available sand in the storage bin has less opportunity to develop its normal physical properties due to reduced and unpredictable mixing and storage.

Batches of sand thus enter the muller at increased temperature, are less uniform in grain fineness and distribution, in moisture, and in clay content. Muller additions cannot rectify this condition and control becomes erratic. As a consequence it is not long before casting defects such as washes and misruns begin to appear, not to mention the difficulties encountered in molding.

Each part of the system should be adjusted to serve the over-all need for efficient low scrap production. Take the mold conveyor. The rate at which this unit moves is linked with the following considerations of good foundry practices:

1. It should move at a rate that is within the specified range recommended by the manufacturer or designer.

2. Within the framework or adequate molding practice, it should not hold back full production.

3. The conveyor should move at a rate that will allow adequate pouring of the molds.

4. The conveyor starting, stopping, and movement should not damage the molds.

5. The mold travel time measured from pouring to shake-out should be long enough to take the cooling castings safely below the critical range of temperature.

6. Proper regard should be given to the possibility of excessive sand heating, especially when the sand to metal ratio is low.

This indicates how the proper functioning of one unit of the sand system, the mold conveyor, is interrelated with numerous aspects of foundry control. Furthermore, the mold conveyor cycle finally chosen should naturally be the best compromise between the minimum needs above and the demands of the over-all operation. At Pacific Cast Iron Pipe, conveyor speed is 33 ft per min.

Obviously, working out a suitable sand for a sand system is a dynamic affair. First the sand must be adapted to the castings produced, type of metal poured, molding methods, design and mechanics of the system, etc. Once however, a basic low loss system sand (less than 2 per cent traceable to sand) with desirable properties is established, it becomes important to make every attempt to attune the system equipment, pouring, molding, gating, etc., to this sand so that it may maintain its uniformity. New jobs should be adjusted to the sand in every possible manner by means of appropriate gating, design, molding, etc., to fit them into the designated controlled range in which the sand is known to perform successfully.

Thus, instead of weakening the sand to get a softer mold, the same effect can be more readily produced by merely ramming the mold less. Or instead of increasing the dry and hot strength of the sand beyond its normal range for one job which presents erosion problems, it is much more practical to make every effort to produce this casting with the use of improved gating, molding, and pouring techniques. Similarly, if a particular mold has a tendency to run out, the remedy should be sought in improved flask and jacket support, proper use of weights, careful molding, etc., instead of disturbing the sand.

The need for a well planned and executed pouring operation should be obvious. For a mold, pouring is truly the moment of decision. All the labor, skill, and planning that go into a mold are decisively judged—it is either a payoff or a bust. The poured molds as they move along the conveyor should not fall apart until they are dumped onto the shake-out. At the shake-out, however, the molding and core sand should display maximum collapsibility with minimum lumping.

Visual check of the castings as they leave the shake-out, or while they are in the buckets before cleaning, provides an excellent check on sand performance and over-all practice. Especially indicative, are any gross surface defects, mold gas conditions, and molding and core sand shake-out characteristics. Inspection after cleaning begins with surface finish and dimension checks. Good surface finish on castings enhances not only their sales appeal but marks them as finished products of engineered foundry effort. The inspection department should be alert to unusual variations in surface finish which can be an omen of an altered practice.

Good sand practice receives its first important test when the molder releases a quantity of sand from his hopper. This batch of sand should be conditioned so as to enable the molder to jolt, squeeze, ram, peen, etc., with minimum effort. The clean mold, with the correct impression and appropriate gating should be capable of retaining its shape unaltered for the duration of the handling, waiting, moving, pouring, and all other operations to which it may normally be subjected while in the green state.

Once the hot metal enters the mold, the sand must possess sufficient permeability, together with any accessory venting needed, to allow the gases to escape. The exit of these mold gases should be controlled to the extent that no damage is inflicted, as a result of their escape, to the contours of the mold or to the soundness and shape of the casting until solidifica-

Molds on continuous conveyor are poured from monorail.

tion has occurred. Adequate and timely release of these gases from the mold cavity can prevent defects such as blows, porosity, pin holes, cold shot, scars, seams, gas holes, plates, blisters, various kinds of erosion with consequent inclusions, misruns, as well as a host of others.

The mold and core surfaces should be capable of resisting any erosion or penetration as a result of the hot metal entering and filling its cavities under normal conditions, until the casting has completely solidified. Under conditions of normal gating, molding, and pouring, the mold should be capable of resisting this severe erosion and pressure of the hot incoming metal if the sand possesses sufficient refractoriness, proper grain distribution and fineness, and is suitably bonded and rammed. It is the proper function of the laboratory to see that the sand is controlled within ranges found to be successful for such purposes in practice.

Sand Test Program

Pacific Cast Iron Pipe tests sand for permeability, green compression, moisture, hardness, density, and dry shear at 2-hr intervals. These constitute the daily routine tests. Cars of sand are sampled and checked as they arrive in the yard. Clay content, grain fineness and distribution, and total combustibles are checked monthly. In addition, at first indication of sand trouble, any or all of these tests are conducted to insure that sufficient data are available for accurate control purposes.

Sand testing is a useful and necessary foundry tool. Sand test data properly used confirm sand practice uniformity or lack of it. Furthermore, through practical application in the plant and as a tool of research in the laboratory, sand testing has helped to establish sand technology as a respected category of engineering knowledge. However, tests by themselves do not necessarily make for a good operation, nor do sand tests as such make for uniformity of practice. Good practice and uniformity come about from properly organized and maintained correct technological know-how, for which sand testing is a necessary tool. Sand tests, therefore, should be conducted only to the extent that the resultant data can be used to shed more light upon some specific problem. To run tests that merely serve to fill out front-office reports is useless.

All this is done in order to secure a sand suited to the desired mold. Furthermore, this mold should be safely filled by the incoming metal in a reducing atmosphere, at a uniform pouring rate, with no damage to the mold and core surfaces. Each casting should be so designed and so positioned in the mold in relation to its gating system and adjoining castings, if any, that progressive feeding and solidification are utilized to the maximum. The heat transfer properties of this mold should serve the contained castings in a like manner.

The rate at which heat is removed from any part of such castings, granting normal section size, must not exceed the critical values for the metal that is poured. This implies control of the cooling rate of the castings from pouring to shakeout, in such manner that the metal is allowed to develop the desirable physical properties attainable during the period of solidification. Under such conditions, assuming adequate composition and melting history, the castings should be free from chill and should machine satisfactorily.

The mold, during pouring, is subjected to high temperatures at the mold and core surfaces. This not only presents erosion problems, but due to the expansion of the individual sand grains, tends to create stresses at these surfaces. The higher the temperature, the more critical this tendency becomes for any given sand and foundry practice. Sand density, fineness, grain shape, clay content, distribution, as well as combustible content, are important characters in this story. The woes these expansion problems bring are rat tails, buckles, and scabs. In designing sand for a system, it is therefore fundamental to consider prevention of casting defects due to sand expansion.

Practice in the author's plant, using a 4-screen sand of controlled fineness and permeability, controlled amount of combustibles (2.5-3.0 per cent) controlled clay content (7.0-9.0 per cent) with proper balance of western and southern bentonites to produce desirable green, dry, and hot strengths, has practically eliminated sand expansion troubles.

Low scrap and good quality castings dictate the extent and nature of those ranges that are desirable to control. Thus, should the sand become lumpy and begin to show signs of difficult shake-out, the first thing to do is to check the dry strength. If as is likely, the desired dry strength has been exceeded, proper adjustment can be readily made by reducing the western bentonite proportionately. However, if tests should indicate that the sand falls within the specified dry strength range, then it becomes necessary to look for some new factor in our practice. If it develops that there is indeed a new and essential factor in the practice, such as harder rammed molds, a re-appraisal becomes necessary, in which the desired dry strength is lowered to suit the new conditions and control maintained accordingly.

Analyze Casting Defects

From a quality control standpoint, the general classification of defects as listed by the Inspection Dept. should be subjected to further analysis, if appropriate corrective measures are sought. For example, say 10 scabs are listed for a certain fitting. That in itself is not sufficient data for proper remedial evaluation because the scabs might be due to erosion by metal or gas, or both, or to excessive sand expansion.

These classifications are likewise broad and can be further refined. Some of the company's green-cored soil pipe fittings, particularly the longer ones, used to scab in the cope until the cores were properly vented. On other occasions it was necessary to grapple with scabbing due to too narrow sand grain distribution, to excessive ramming and wet sand, to poor gating arrangement, and other causes. All these were naturally listed as scabs. It is, therefore, the function of a quality control program to determine the specific factors responsible for defects, that are categorized in general terms by the Inspection Dept. Once this is done, and the specific cause for a defect is detected and pinned down, the next step is, of course, its elimination.

In analyzing casting defects, the defective casting and its history should be correlated with relevant technological data.

Now, There's an Idea!

Solves Sand Elevator Problem

THOMAS F. MURPHY / *Foreman, Foundry Maintenance*
Worthington Corp., Harrison, N. J.

Practical ideas, developed and proved in foundries and pattern shops, are presented on this page. They may be of any length, preferably short, illustrated by photo or sketch.

■ Two problems on our Brass Foundry distributing elevator were causing considerable maintenance.

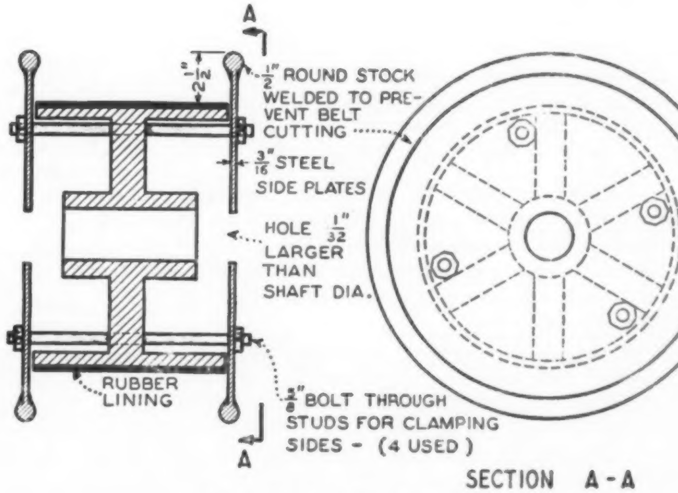
The elevator belt was continually shifting and wearing through the housing on either side. This not only was damaging to the housing but was injurious to the belt as well. In addition, we had a large accumulation of sand outside the housing at the bottom pulley. This sand was escaping through the slots that permit vertical movement of the bottom pulley shaft as required by the automatic take-up.

We solved both of our problems in the following manner:

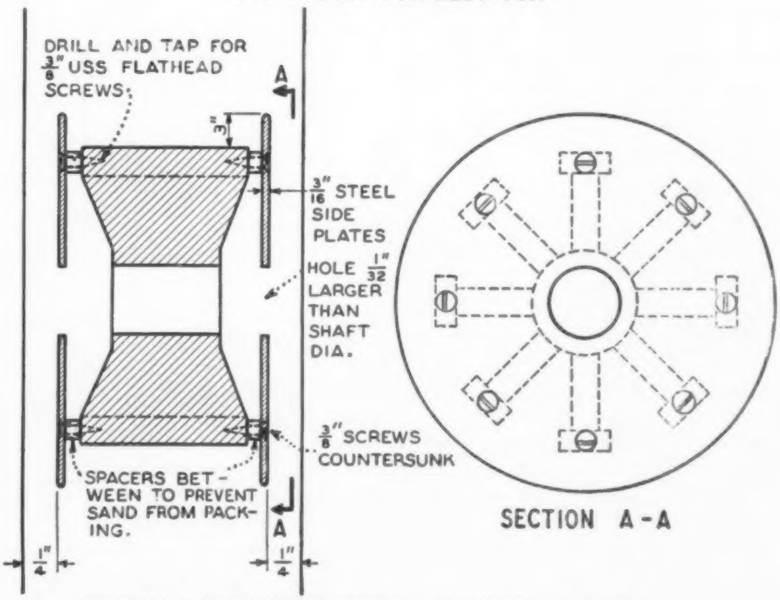
The top, or driving pulley, was fitted with two disks 3/16 in. thick and 6 in. larger in diameter than the pulley itself. These disks were mounted directly on either end of the pulley and a ring of ½-in. round stock was welded to the circumference to minimize belt scuffing.

The bottom, or tail pulley, was fitted with similar disks which were mounted to clear the inner wall of the elevator housing by ¼ in. This greatly reduced the amount of sand that could escape through the take-up slots.

These modifications have been in service four months and have proven satisfactory.



TOP PULLEY FOR ELEVATOR



BOTTOM (FOOT WING TYPE) ELEVATOR PULLEY

Answers to foundry cost questions make up one of the most popular types of sessions staged by the AFS Cost Committee. Here are some brought out at the 1954 Convention of the American Foundrymen's Society by C. R. Culling, Carondelet Foundry Co., St. Louis, A. C. Sinnett, Terre Haute Malleable & Mfg. Co., Inc., Terre Haute, Ind., and C. E. Westover, Westover Engineers, Milwaukee.

Cost Questions Answered

Q . . Normalized Costs. We hear a great deal about normalizing of overhead rates. Are normalized costs useful?

A . . There is considerable controversy concerning normalized overhead rates. However, there is something to be said for normalization. The first step is to establish what you consider to be a normal rate of production. Burden rates are then established on this volume of production.

Assuming that production rate increases due to unusual demands, you have an over-absorption of overhead and normal mark-up would be expected to yield a greater margin of profit. If production drops below the established normal, then through the process of normalizing you have an under-absorption of overhead, and normal mark-up would be expected to yield a smaller margin of profit.

Competitively, most foundrymen agree that during periods of low production it is necessary to use normalized overhead burden rates. Further, if you do not use normalized rates when production is unusually high, you are in a relatively poor position profit-wise when production drops.

Q . . Estimating vs. Actual Rates. What is the difference between estimating rates and actual overhead rates?

A . . When you estimate costs on new work, you frequently use normalized rates which may not be based on present volume of operation. You are, therefore, basing estimated costs on normal production volume. During this period you also have actual overhead rates based on actual production.

Even though you use normalized rates, you should maintain current operating cost data to indicate within reasonable limitations where you stand. Another point: after the initial run on a job based on estimated rates, it is always advisable to check individual costs on the jobs, using actual operating results. This assumes that you carry individual cost records on at least all of your production jobs.

Q . . Review Cost Factors. How frequently should we review our burden rates and other cost factors?

A . . A full review of cost data every quarter is generally sufficient to keep your system in good order. However, any unusual changes which occur between quarters should be noted and corrections made. For example, a wage increase or increase in the cost of pig or scrap can throw your rates badly out of balance. It is a relatively simple task to correct rates by making allowances for such increases.

Even though you review your cost data on a quarterly basis, it is advisable to prepare a monthly statement of profit and loss to check current operations.

Q . . Unusual Jobs. The great majority of our work can be covered properly by a basic cost system. What do we do about the small percentage that doesn't fall in this category?

A . . If the majority or your work is similar in weight, size, quantity, cores, etc., the basic cost system will serve for those castings and will provide a point from which to work in arriving at costs on the unusual or miscellaneous jobs. Fairly accurate costs for the unusual jobs can be determined by spot checks and time studies to arrive at the degree of variance from average.

Bear in mind that costs in some departments may vary more widely than in other departments on these jobs. This is particularly true in the cleaning and shipping departments. Another departmental cost which should be checked carefully in miscellaneous cost is core making, particularly when core weight is a factor. The yield in castings from an individual mold may be about normal, yet there may be four or five times the number of castings to handle in the cleaning department, or a similar increase in core costs, in order to yield the same weight of castings.

The main thing to remember is that these unusual jobs must be given individual cost attention. Otherwise, you may find yourself in the position of increasing production on this type of work to the extent that it will influence adversely the cost on your regular production runs.

Q . . Metals. Should metals be considered as a cost separate from the melting department?

A . . Yes. Metals are the only materials in a casting. This cost should be identified separately for comparative purposes. It is also necessary to know this cost when properly distributing overhead costs.

Q . . Yield. Is the determination of yield necessary for cost finding?

A . . No, not as such. However, it is necessary to know the total mold metal weight for proper cost distribution. The difference between metal melted and metal poured into molds should be considered as a part of melting costs.

Q . . Administrative and Selling Costs. Should administrative and selling costs be applied to cost of metals in arriving at total costs?

A . . No, because in certain instances they influence to too great a degree the amount of these costs in relation to the cost of making the casting. This thinking is based on the belief that we are not selling metal but are selling the cost of converting metal into castings.

Q . . Core Cost. Why should there be a core cost rate based on core weight?

A . . There is no direct relationship between the weight of a core and the labor required to convert the core mix into a finished core. Therefore, core costs should be divided into at least two factors—core weight and direct labor costs.

Q . . Depreciation Costs. Why is replacement value recommended for determination of depreciation costs?

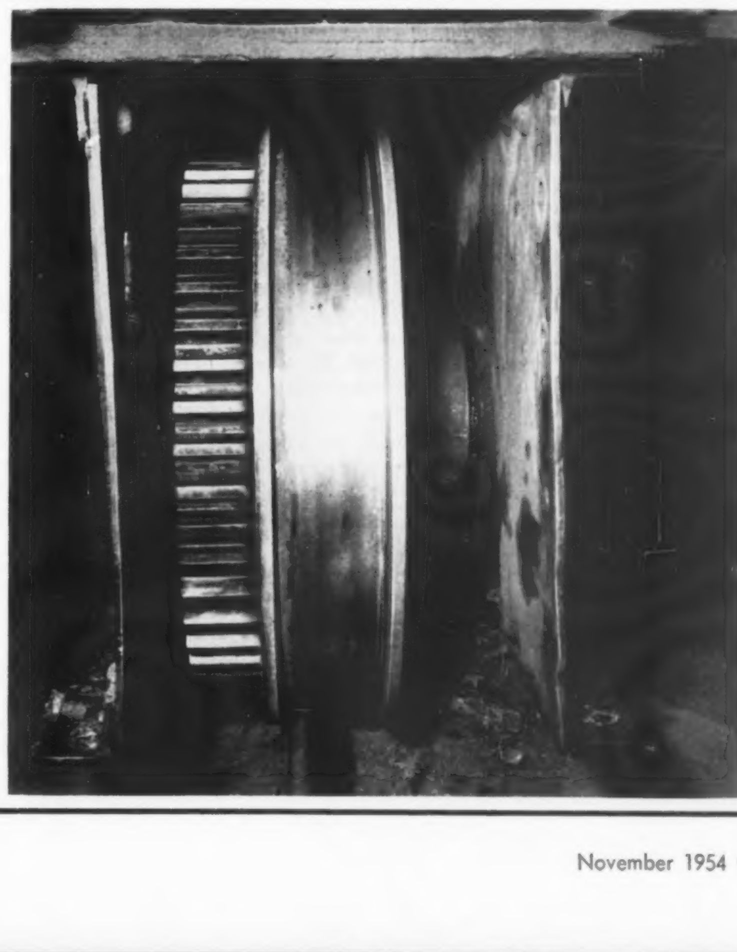
A . . Reserves based on Internal Revenue rates on original values are insufficient to provide funds for replacement of abandoned equipment. Using the same rates, but applied to replacement values, would still be short the required amount due to the application of income tax to the additional profit. However, such a procedure improves the situation and the amount of the difference should be segregated from surplus as is now done for depreciation reserves, but as another reserve.

Q . . Cost of Costing. What is the cost of operating a cost system?

continued on page 62

Here's How **Kaiser Steel Corp., Fontana, Calif., is turning up significant dollar savings in maintenance and downtime by use of Tool Steel Process Equipment. Photo shows a TSP Gear and Wheel supporting a 50-ton gantry crane. After five years of hard service there is no wear on teeth. Small grooves in centers of teeth are TSP identifying marks. Reason for the unusual long life of TSP products is that they are hardened by a special process. File-hard surface extends to the full depth of permissible wear, and the core is refined for toughness and ductility to give maximum strength. Additional literature is available on TSP products.** ***Tool Steel Gear and Pinion Co., Dept. A.***

For more data, circle No. 694 on p. 17



continued from page 61

A . . This is a common question that is of considerable importance, especially to a small foundry. The cost necessarily depends upon the end use. If it is for the purpose of developing a costing formula, the cost possibly would be one clerk. In most instances, the necessary statistics are already available and need only be properly recorded and summarized for use when required. However, if cost control and budgeting is to be developed, the clerical requirements would increase. This also, no doubt, would require purchasing of additional file and calculator equipment. Some cost installations require no additional clerical assistance and one installation is known that improved its predecessor and required fewer clerks.

Q . . Short Runs. How can we apply excessive costs due to short runs, to the cost of a given pattern?

A . . Determination of a job start cost will gather most of the excessive costs. If this is done, and premium wages paid direct labor operators are applied to the specific pattern, overhead charges will be comparably higher and the net result will reflect most, if not all, of the short order expenses.

Q . . Job Start Costs. How are job start costs determined?

A . . Determine what expenses are involved in starting a job in production. The elements of cost will vary considerably, so it is recommended that costs be developed for each type of job, and only those applicable to the job be accumulated in a job start cost. Under molding, types of jobs would include squeezer, cope and drag, and roll-over, and these should be developed for both mechanized and non-mechanized operation if both apply in your foundry. Core work should be divided according to blower and bench work.

When analyzing what equipment is necessary for the molders or the coremakers to start production, the direct cost of supplying them with this equipment is the basic cost to be considered. To this must be added payroll costs and supervision if practical. In developing a cost formula, job start costs must be eliminated, otherwise a duplication of costs will result. To eliminate such costs, separate accounts should be set up for segregation of this class of labor and appropriate deductions should be made for this labor for payroll costs when a new formula is calculated.

With this arrangement, the cost of production from a given pattern will vary in direct proportion to the order quantity when a fixed job cost is used. Also, if an order covers several production periods, the job cost should be increased by the number of times the pattern will be placed in production for completion of the order, when calculating a unit cost.

Q . . Standard Cost. Should set-up be included in the standard cost of a casting?

A . . Very definitely not. The inclusion of a job set-up makes a standard cost on a casting impossible. A standard cost is a predetermined figure that does not vary as the job is run from time to time. It does not vary regardless of whether the run is one mold or 100 molds.

For example, the standard cost of a casting made on a molding machine is determined to be \$5.00 per piece. If the standard set-up cost of 30¢ were included, the apparent "standard cost" would then be \$5.30 if one piece were being run. If the order were for 10 pieces, the set-up would be 3¢ per mold and the apparent "standard cost" would be \$5.03 per casting. Such fluctuation obviously defeats the purpose and violates the meaning of true standard costs.

Set-up is a portion of the quantity differential used in setting selling prices, and should never be used in any other manner. It is equally important to emphasize the fact that job set-up must be used in price setting although it must not be used in setting the standard cost.

Q . . Core Sand. How should core sand costs be absorbed in pricing and cost accounting?

A . . All too often, core sand costs are included in the general core room overhead and absorbed on the basis of hours or minutes of direct core labor. This is incorrect. Sand cost is clearly fixed and is directly proportional to the weight of the core being made.

The wide range of error possible is shown in figures taken from an iron foundry core room. The time standard for making various cores picked at random from the file were plotted against the weight of the core. There was absolutely no correlation. Two specific cases showed:

CORE	DIRECT LABOR	CORE WEIGHT
A	7 min.	3 lb
B	7 min.	30 lb

Using an hourly rate of \$1.80 for a coremaker and 1¼¢ per pound for the cost of the core sand (including all overhead costs involved in sands when properly segregated), the cost figures on the above cores would be:

CORE	DIRECT LABOR	SAND	TOTAL
A	\$0.21	\$0.0375	\$0.2475
B	\$0.21	\$0.375	\$0.5850

These figures represent the true cost picture. If core sand had been hidden in the department's general burden, its cost would have been absorbed equally between the two cores when based on equal direct labor.

Accomplishing the proper absorption is simple. Just as a core department is established in the accounting records to segregate its expense and determine the burden rate, a sand department can be set up to accumulate all items of labor, depreciation, and maintenance on muller equipment, power, prorated costs, etc. The costing rate per pound of sand can then be fixed and changed to each job on the basis of the actual requirements of that job.

Curing Cupola Burn-Out

J. A. Dean/*Manager, Nemco Foundry Div. of Nelson Electric Mfg. Co., Tulsa, Okla.*

Problem. Stop repeated, severe burn-out of cupola lining at point shown on diagram. Cupola has a 51-in. shell lined to 33 in., a rear slag hole, four 5 x 12-in. tuyeres, a ratio of total tuyere area to melting zone area of 1:3.5, and a fan-type, constant-speed blower.

Solution. At first it appeared from the position of entrance of air into the wind box that tuyeres No. 1 and 2 were receiving excessive amounts of air, causing greater penetration and excessive burn-out at the point indicated on diagram. To remedy this, 1/4-in. plates were cut from steel scrap to fit in the bottom of the tuyeres in hope of obtaining a more even distribution of air by blocking the tuyeres thought to be receiving a larger quantity of air. To determine the total number of plates which could be inserted in the tuyeres, without drastically changing the melting operation, we arbitrarily selected a tuyere to melt-zone-area-ratio of 1:4 as a maximum. This would allow us to insert two 1/4-in. plates in each tuyere, and would reduce the total area by 24 sq in. (1/2 x 12 x 4). Plates could be moved from one tuyere to another for better distribution of blast without changing the tuyere ratio.

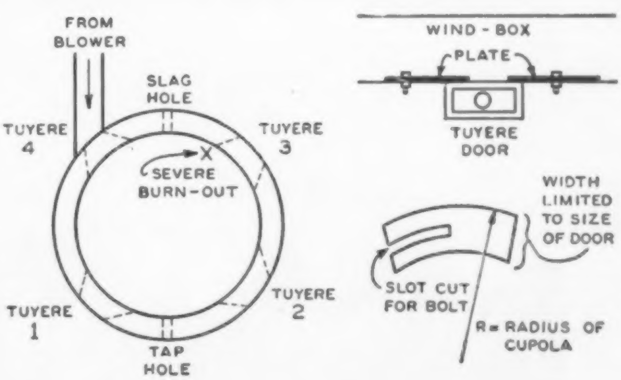
With the cupola cleaned and patched and the bottom doors open, the wind was turned on and let run for a minute or two to become stabilized. If a variable speed blower is available only about 1/4 to 1/3 speed is required, but in our case the blower was run at normal speed. With the aid of a velometer, we measured relative air velocity by determining the number of revolutions the velometer made in a specified length of time (minimum 30 seconds) at the throat of each tuyere.

It is important to hold the velometer in the main air stream of each tuyere even if it must be held to one side or the other of the tuyere itself. This insures getting a maximum reading on each tuyere and thus a measure of penetration of the air blast. The readings are used for comparison with each other and therefore it is not necessary to convert these figures to feet per second because the ultimate desire is to have each tuyere reading the same, or as nearly so, as possible.

Our first set of readings with two 1/4-in. plates in each tuyere were: No. 1, 1460; No. 2, 940; No. 3, 1130; and No. 4, 2160. Tuyeres 2 and 3 were receiving the least amount of air and No. 1 and 4 the most—somewhat different from our first assumption.

In attempting to get a balance, the two plates from

Checking tuyeres of cupola during study of air distribution are Tommie Hill (left) and Ernest Perry.



Burn-out in relation of tuyeres and blast pipe is shown at left. At right is No. 4 tuyere with throttling plates in place and sketch of plate.

No. 1 tuyere were placed in No. 4, and the plates were removed from No. 2, one being placed in No. 3, the other in No. 4. Tuyeres 1 and 2 were now completely open, No. 3 had three plates and No. 4 had five plates.

A second set of readings showed: No. 1, 580; No. 2, 1250; No. 3, 1570; and No. 4, 1880. This was some improvement, but showed that it would be impossible to balance the cupola by the further insertion of plates without a drastic change in the tuyere ratio and thus a change in the melting operation. Therefore, some other method of redistribution of air had to be found.

On our cupola the tuyeres are located just below the wind box (see sketch) so that a plate cut as shown could be inserted in the tuyere door and bolted flat on the bottom of the wind box, partially covering the opening between the wind box and the tuyere. Two plates were cut and bolted in place with an opening of approximately 4 in. A third set of readings gave: No. 1, 1040; No. 2, 1345; No. 3, 1730; and No. 4, 1870.

After adjusting the plates to reduce the quantity of air entering No. 4, a fourth set of readings showed: No. 1, 1700; No. 2, 1310; No. 3, 1420; and No. 4, 1575. Plates similar to the one shown in the diagram could have been inserted above each tuyere but this did not seem necessary.

Payoff. The cupola has been brought into a more nearly balanced wind condition, the hot spot completely eliminated, and a better melting operation obtained. Total cost: two nuts and bolts, some scrap plates, and a little acetylene cutting.

Acknowledgment. The author wishes to acknowledge the assistance of Jack Doerres (then with Great Lakes Carbon Co., St. Louis, who supplied the velometer), Ernest Perry, general foreman, and Tommie Hill, cupola tender.

Restore America's First Iron Works

Birthplace of the iron and steel industry and location of the New World's first operating foundry have been restored and were dedicated September 17 at Saugus, Mass., 10 miles north of Boston. Operated from about 1646 to 1670, the Saugus Ironworks was rebuilt at a cost of more than $1½ million. Dedication of the restored buildings and equipment climaxed six years of research and reconstruction sponsored by the First Iron Works Association and financed by the American iron and steel industry.

Built just 25 years after the landing of the Pilgrims, the Saugus works was equal to some of the finest plants in Europe. A large operation, the plant employed about 80 and produced about 150 tons of cast and wrought products a year. The 21-ft high furnace (left) produced cast iron sows (bars) for conversion to wrought iron, as well as metal for castings.

Recommended Minimum Standard for Commercial Carbon Steel Castings

ORIGINATED BY
STEEL FOUNDERS' SOCIETY OF AMERICA

■ This recommended minimum standard is applicable to steel castings commonly referred to as "commercial carbon steel castings" (readily weldable grade).

This minimum standard shall apply only when no customer specification, calling for another order of quality, is made a part of an order.

It cannot be too strongly emphasized that the requirements of this standard are suggested minimums, and that they are not intended to influence in any way the production of castings which are improvements on these minimums.

It is the intent of this recommended minimum standard that all clauses apply unless otherwise agreed upon by producer and customer.

A. . Material and Workmanship

A-1. The castings shall, as determined by visual examination, be free from cracks, shrinkage cavities, hot tears, swells, scabs, blowholes, and pinhole porsity, that impair the utility of the castings.

A-2. Castings shall be free from sand and scale on all surfaces to the extent that normal machining operations can be performed without the necessity for further cleaning by the customer.

B. . Detail Requirements

B-1. Castings shall have gates and risers removed in such a manner that no riser or gate stub projects beyond the casting design contour in an amount that would exceed the following values:

Riser or Gate Maximum Dimension, in.	Maximum Projection, in.
Up to 4	1/8
4+ to 8	1/4
8+ to 20	3/8
20+ to 30	1/2
Over 30	3/4

B-2. The removal of gates and risers shall not produce depressions which are more than 1/8″ below the casting design surface; except that for castings having risers greater than 20″ maximum dimension the depression shall not be more than 1/4″ below the casting design surface.

B-3. The responsibility for furnishing castings that can be laid out and machined to the finished dimensions, within the tolerances given and without further straightening by the customer, shall rest with the foundry only if both a pattern and drawings are furnished. If the foundry is furnished a pattern without accompanying drawings, the foundry fulfills its responsibility as to casting dimensions by furnishing castings which are true to the pattern.

B-4. Castings shall be within a weight limit of +5 or −3 per cent.

C. . Heat Treatment

C-1. Pyrometric equipment shall be used to enable the heat treating procedures given in C2 to C4 to be satisfactorily carried out. Pyrometric equipment shall be maintained in accurate condition at all times. Checks

Recommended minimum standard calls for continuous control of quality of steel castings through determination of tensile strength, yield point, elongation, and reduction in area.

Foundry Facts

Steel Casting Standard

for accuracy shall be made at least once each 30 days.

C-2. Castings shall be heat treated by one of the following three methods at the option of the manufacturer:

(a) Full Annealing

(b) Normalizing

(c) Normalizing and tempering (stress relieving)

C-3. *Heating.* Regardless of the heat treatment employed, the castings shall be uniformly heated to a temperature above the transformation temperature and shall be held at this temperature for a sufficient length of time to refine the grain. The temperature difference between the hottest and coolest part of the charge during the holding period shall not be greater than 75F (See Note A).

NOTE A. For information on the transformation temperature for commercial carbon steel castings see Fig. 283, page 209, in the *Steel Castings Handbook*, 1950 edition.

C-4. *Cooling.* The castings shall be cooled as follows:

(a) Full Annealing. Castings shall be cooled slowly in a closed furnace from the annealing temperature. When the temperature of the furnace has fallen to 1000F the castings may be removed and cooled in air.

(b) Normalizing. The castings shall be removed from the furnace and cooled in air.

(c) Tempering (stress relieving). Castings shall be heated to a temperature below the lower critical and held at this temperature for not less than one hour. After the heating period the castings may be furnace cooled or removed from the furnace and cooled in air.

D. . Repair of Defects

D-1. The welding of steel castings, whether for repair of defects or addition of other structures, is permitted at any point in their processing provided the following conditions are complied with:

(a) The defect shall be thoroughly and completely removed.

(b) The area to be welded shall be clean and free from sand and scale or other extraneous material.

(c) The welding shall be performed in accordance with the procedures stipulated in the *SFSA Recommended Practice for the Welding of Steel Castings.*

E. . Methods of Sampling, Inspection and Tests

E-1. All castings shall be surface inspected for defects and surface appearance after final cleaning for shipment.

E-2. Representative castings from each order or lot shall be inspected for adherence to tolerances.

E-3. It is recommended that for castings in lots of 50 or more and, if practical, castings should be inspected by destructive or non-destructive tests to ascertain whether they are sound as *ASTM Radiographic Standards, E-71, Class 4.*

E-4. One tension test shall be made from each heat in each lot. The design of such test coupons shall be the standard ASTM test coupons illustrated in *ASTM Tentative Methods and Definitions A370-53T (Mechanical Testing of Steel Products).* If any test specimen shows defective machining or develops flaws, it may be discarded and another specimen substituted from the same lot. The term "lot" shall be considered as all castings in a heat subjected to the same heat treating procedure.

After meeting acceptance tests for ten consecutive heats used for making castings of any one grade, the manufacturer may assemble the castings from succeeding melts in groups of five heats each. The castings in each such group shall be accepted on the basis of one test specimen taken from every fifth heat, provided that the chemical analysis of all the heats in the group falls within the range established by the first ten consecutive acceptable heats and all subsequent heats that are physically tested and found acceptable. If this test fails, the heat may be requalified by using another specimen, and the four other heats in the group shall be tested individually.

The same heat-treating procedure used for the first ten consecutive heats shall be used for all subsequent heats. This procedure shall be established for each grade separately.

E-5. In cases where more than one heat is poured into a ladle (teeming of several heats), the heat shall be deemed to be the ladle from which the castings are finally poured.

E-6. The coupon, for mechanical test specimens, shall be poured with metal which has received deoxidation treatment identical to that metal from which the castings are poured.

E-7. One tension-test specimen from each lot (as qualified in paragraph E-4) shall be tested and shall meet the minimum properties noted in Table 1.

E-8. When any test specimen shows defective machining or obvious lack of continuity of metal, it may be discarded and replaced by another specimen from the same lot.

E-9. In the event two test specimens from any lot fail to meet the minimum requirements noted in Table 1, the castings may be re-heat-treated as often as desired with a coupon from the same heat.

E-10. Chemical analysis of each heat shall be made to determine acceptance as noted in Table 1. Drillings for chemical analysis may be taken from broken test specimens, castings poured in the heat or from a separate block representing the melt (See Note B).

NOTE B: The alloying elements Mo, Cu, Ni and Cr need not be determined by analysis on every heat, but it is recommended that they be determined at intervals.

Table 1 . . Chemical and Mechanical Property Requirements

Chemical Composition—Maximum per cent								
C*	Mn*	Si†	P	S	Mo**	Cu**	Ni**	Cr**
.33	.70	.80	.06	.06	.20	.50	.50	.25

*For each reduction of .01 per cent carbon under the maximum specified, an increase of .04 per cent manganese above the maximum specified will be permitted.

†Minimum silicon permitted is .25 per cent.

**Total content of these unspecified elements shall not exceed 1.00 per cent.

Mechanical Properties***

Tensile Strength Minimum psi	Yield Point Minimum psi	Elongation in 2 inches % Minimum	Reduction in area % Minimum
60,000	20,000	24	35

***Mechanical properties shall be determined on the standard 0.505 inch diameter tensile test bar, either with or without threaded ends.

Release Tentative Program For 1955 AFS Convention

General Sam Houston leading his men to battle at San Jacinto. Statue stands at entrance to Hermann Park in Houston.

PROGRAM for the 1955 AFS Convention, to be held in Houston, Texas, May 23 through 27, is taking shape as technical committees develop plans for the five-day non-exhibit meeting. As in the past, technical sessions are grouped by foundry interest to enable busy foundrymen to take in the maximum number of meetings in the minimum time. Thus (see adjacent tentative program) brass and bronze, malleable, and light metals sessions are scheduled for the early part of the week while gray iron and steel are scheduled for the middle and latter part of the week.

Sand sessions will run throughout the week. Others, such as safety, hygiene, and air pollution control, education, industrial engineering, refractories, and heat transfer are planned for the middle of the week.

Technical highlight of AFS Convention Week will be the Charles Edgar Hoyt Lecture the morning of Wednesday, May 25, with F. J. Walls, International Nickel Co., Detroit, as speaker. The Hoyt Lecture will follow the Annual Business Meeting at which President F. J. Dost, Sterling Foundry Co., Wellington, Ohio, will deliver his presidential address and present cash awards and certificates to top winners in the AFS Apprentice Contest.

In addition to the more formal technical meetings at which prepared papers will be presented, there will be a number of round table luncheons and shop course sessions. The informal, give-and-take discussions of these sessions will appeal again this year, as in the past, to foundrymen interested in discussing shop problems.

For the first time, the Light Metals Div. will sponsor at least one paper by a member of the Aircraft Industries Association. The Association of American Railroads will be represented by at least one paper dealing with recent improvements in steel castings for railroad equipment.

Exchange papers are expected from the technical foundry groups of England, Australia, Switzerland, and Germany. A series of papers sponsored by the Gray Iron Div. will deal with large-scale experiments in desulphurizing, carbon control, and upgrading of iron by carbide injection.

The Cost Committee will sponsor at least two papers dealing with top management problems.

Program of the Sand Div. is virtually complete. It has been developed around

continued on page 84

Tentative Program . . . 59th Annual Meeting American Foundrymen's Society Houston, May 23-27, 1955

MONDAY, MAY 23

- 9:00 am. . Registration Opens
- 10:00 am. . Technical Sessions: Brass & Bronze; Malleable
- 12:00 noon. . Round Table Luncheons: Brass & Bronze; Malleable
- 2:00 pm. . Technical Sessions: Brass & Bronze; Light Metals; Sand
- 4:00 pm. . Technical Sessions: Brass & Bronze Shop Course; Light Metals; Malleable Shop Course—*"Pearlitic"*
- 6:00 pm. . President's Reception
- 7:00 pm—AFS Alumni Dinner
- 8:00 pm. . Sand Shop Course—Gray Iron—*"Fitting Sand Control to Your Foundry"*

TUESDAY, MAY 24

- 8:30 am. . Registration Opens
- 9:30 am. . Technical Sessions: Light Metals; Industrial Engineering; Education; Malleable; Sand
- 12:00 noon. . Round Table Luncheons: Light Metals; Education
- 2:00 pm. . Technical Sessions: Safety, Hygiene, and Air Pollution Control; Industrial Engineering; Brass & Bronze; Sand; Malleable
- 4:00 pm. . Technical Sessions: Brass & Bronze Shop Course; Malleable Shop Course—*"Hot Tearing"*; Safety, Hygiene, and Air Pollution; Light Metals
- 6:00 pm. . Sand Division Dinner
- 6:30 pm. . Canadian Dinner
- 8:00 pm. . Sand Shop Course—Gray Iron—*"Sand Preparation Without Guesswork"*

WEDNESDAY, MAY 25

- 8:30 am. . Registration Opens
- 9:30 am. . Annual Business Meeting
- 10:15 am. . Charles Edgar Hoyt Annual Lecture. Speaker: F. J. Walls, International Nickel Co., Detroit
- 12:00 noon. . Round Table Luncheons: Pattern; Industrial Engineering; Gray Iron
- 2:00 pm. . Technical Sessions: Refractories; Plant & Plant Equipment; Sand; Steel; Light Metals
- 4:00 pm. . Technical Sessions: Gray Iron; Safety, Hygiene, & Air Pollution Control; Pattern; Sand; Heat Transfer
- 7:00 pm. . AFS Annual Banquet

THURSDAY, MAY 26

- 8:30 am. . Registration Opens
- 9:00 am. . AFS Past Presidents' Breakfast
- 9:30 am. . Technical Sessions: Gray Iron; Pattern; Sand; Steel
- 12:00 noon. . Round Table Luncheon: Steel
- 2:00 pm. . Technical Sessions: Sand; Gray Iron; Refractories; Safety, Hygiene, & Air Pollution Control; Cost
- 4:00 pm. . Technical Sessions: Gray Iron; Sand; Heat Transfer

FRIDAY, MAY 27

- 8:30 am. . Registration Opens
- 9:30 am. . Technical Sessions: Gray Iron; Sand; Steel
- 2:00 pm. . Symposium on Non-Destructive Testing

Release GIFS Program

Program for the annual meeting of the Gray Iron Founders' Society, to be held at The Homestead, Hot Springs, Va., November 10-12, includes meetings of the directors, reports of officers and committees, and panel sessions on insurance, markets and sales, luncheon and dinner meetings feature speakers on government and economics, announcement of new officers and directors, and presentation of awards.

Full program follows:

WEDNESDAY, NOVEMBER 10

10:00 am. . MEETING. Retiring & New Board of Directors.
6:30 pm. . RECEPTION.
7:30 pm. . PRESIDENT'S DINNER.

THURSDAY, NOVEMBER 11

9:00 am. . REGISTRATION.
10:15 am. . ANNUAL MEETING.
"Report of the President," Henry J. Trenkamp. Ohio Foundry Co., Cleveland.
"Report of the Treasurer," Walter O. Larson, W. O. Larson Foundry Co., Grafton, Ohio.
"Report of the Executive Vice-President," Donald H. Workman.
"Report of the Technical Director," Charles F. Walton.
11:00 am. . *"Report of Program Evaluation Committee,"* C. R. Culling, Carondelet Foundry Co., St. Louis.
12:00 noon. . RECEPTION.
12:30 pm. . LUNCHEON. Presentation of Retiring Board of Directors. Speaker: Wendel B. Barnes, Administrator, Small Business Administration, Washington, D. C.
2:00 pm. . *"Product Liability Insurance,"* James O. Honeywell, New Amsterdam Casualty Co., Baltimore.
"Bailee Legal Liability Insurance," George V. Whitford, Fire Association of Philadelphia, Pennsylvania.
3:00 pm. . QUESTION and ANSWER PERIOD.
6:30 pm. . RECEPTION.
7:30 pm. . BANQUET.

FRIDAY, NOVEMBER 12

9:00 am. . REGISTRATION.
10:15 am. . *"Markets Are Where You Find Them,"* N. R. Ladabouche, *Steel.*
"Increasing Your Sales Through Product Development," Ross L. Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., chairman, Product Development Committee, SFSA.
Remarks by Paul W. Vanderburg, chief, Castings Section, Business & Defense Service Administration.
12:00 noon. . RECEPTION.
12:30 pm. . LUNCHEON. Presentation of New Officers and Directors. Presentation of 1954 Citations and Awards. Speaker: Martin R. Gainsbrugh, chief economist, National Industrial Conference Board.
2:30 pm. . ADJOURNMENT.

SATURDAY, NOVEMBER 13

10:00 am. . MEETING. New Board of Directors.

CASTING through the Ages

Third General Assembly Scheduled for June, 1955

The technical administrative council of the Institute of Iron and Ore, Madrid, Spain, has changed the date of its Third General Assembly in the month of June, 1955, at which time there is in Barcelona the International Fair to be visited by foundrymen attending the convention. Plans have been made to visit the main industrial plants in the North of Spain and Cataluna.

Change in date will serve to give more time to those preparing to present papers at the convention and will afford a better time of the year in which to view the beauties of the country.

Free Tear Sheets

of all AMERICAN FOUNDRYMAN articles are available on request. Keep your magazine intact and pass it on for others to use. For free tear sheets, write to Editor, AMERICAN FOUNDRYMAN, Golf & Wolf Roads, Des Plaines, Ill. Please show company connection and your title on tear sheet request.

Nozzle for jet plane's air conditioner which keeps cockpit temperature down.

RADIOGRAPHY

says:

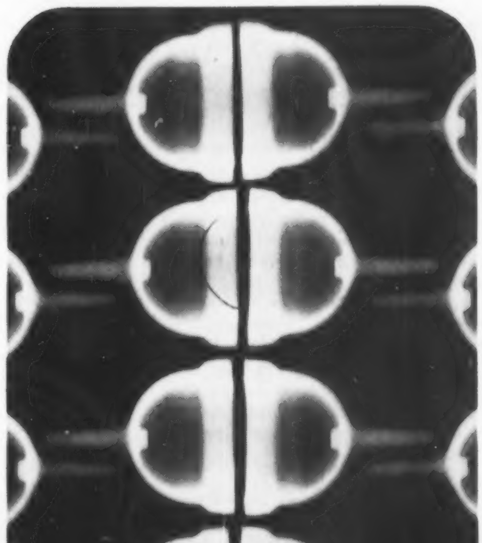
"O.K. to Machine"

COMPLEX MACHINING is required to transform this casting into the precision nozzle of a jet plane's air conditioner.

Fourteen intricate, curved vanes are cut in the rough casting's rim. Tolerance is .002 inch. This means plenty of high-cost machine time—which could be a total loss if it is left to the cutting tools to find any defect in the casting.

Radiography avoids that . . . shows up shrink or other faults before machining is begun. Only those castings proved sound are worked. Time and money both are saved.

Easy to see, isn't it, how radiography pays off? And if you would like to know other ways it can help you, like improving yield in production runs, here's a suggestion: Talk it over with your x-ray dealer. Or, if you like, drop us a note saying, "Send me a free copy of Radiography as a Foundry Tool."



Radiograph shows castings with "shrink"—saves costly machining time.

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N.Y.

Radiography . . .

another important example of Photography at Work

Kodak

For more data, circle No. 670 on postage-free Reader Service card, p. 17 or 18

Foundry Tradenews

Lester B. Knight & Associates, Inc., Chicago, has acquired **Dailey, Brenner & Schreiber, Inc.,** management consultants. It will be operated as a division of the parent company, with Lester B. Knight as chairman and Roger Kent Dailey as president. Mr. Daily also becomes vice-president of Lester B. Knight & Associates.

Inductotherm Corp., Glenolden, Pa., announces the Inducto Heating and Melting Equipment, a newly-designed line of high frequency induction equipment for ferrous or non-ferrous metals. Included in the line is the Inducto Metal Melter, a unit in which the melting table is an integral part of the cabinet.

Cooper-Bessemer Corp., Mount Vernon, Ohio, has published a bulletin "Controlled Castings" which provides details of foundry facilities at Cooper for casting gray iron, Meehanite and ductile iron. Bulletin gives range and capacity of foundry for molding and shows types of castings now produced.

Hansell-Elcock Co., Chicago, has published a booklet, "Gray Iron Castings, Specification Engineered," which points out engineering considerations and illustrates the plant and many of the castings produced.

Lynchburg Foundry Co., Lynchburg, Va., has completed a new $1,250,000 addition for the manufacture of shell molded castings. Addition is designed to produce gray and nodular iron castings by the newly developed shell molding process on a mass production basis.

Alloy Casting Institute has published a set of data sheets covering the properties of all the more popular grades of alloys used for corrosion resistant (stainless Steel) Castings. Consisting of 13 individual data sheets describing each of the cast corrosion resistant alloy grades, the complete set is bound in a file folder.

Lithium Corp. of America, Inc., Minneapolis, has opened a sales office in New York City. J. Douglas Campbell is the representative in charge.

City Pattern Foundry and Machine Co., Detroit, has published a booklet which takes you on a picture trip through the firm's plant.

Foundry Service Co., Birmingham Ala., is a new representative for the **Ironton Fire Brick Co.,** Ironton, Ohio. The company will handle accounts in Alabama, Georgia and South Carolina. A complete warehouse stock will be maintained here for prompt shipments.

American Brake Shoe Co. has published its first complete catalog, with emphasis on industrial products. The 48-page, two-color book illustrates representative parts produced by 11 divisions of the company and details physical properties or characteristics where pertinent.

Cooper Alloy Foundry Co., Hillside, N. J. has announced that in view of continued extension of facilities and services the name of the company has been changed to **Cooper Alloy Corp.**

Mercast Corp., New York City, has released a new booklet which presents the complete story of the use and advantages of the frozen mercury process for producing larger and more complex precision castings. Eight-page booklet is liberally illustrated with step-by-step action photos of the process, plus numerous pictures of finished parts.

Frederic B. Stevens, Inc., has announced the opening of a new district office and warehouse at 4000 East 16th St., Indianapolis. The completion of a new foundry and metal finishing supply warehouse in Windsor, Ontario, near their present plant and warehouse at 1262 McDougall, has also been announced. A new addition to the Springfield, Ohio, plant was also completed.

R. Lavin & Sons, Inc., has announced the completion of over 50,000 sq ft of additional new production facilities at its Chicago Plant.

Basic Refractories, Inc., Cleveland, was announced as one of the 23 recipients of the "Second Annual Saturday Review Awards" for distiguished advertising in 1953. The award is presented ". . . to recognize annually national advertisements which best serve the public interest, and which most searchingly document the continuing miracle of America." Copies of the 13 ads, in booklet form, are available from the company on request.

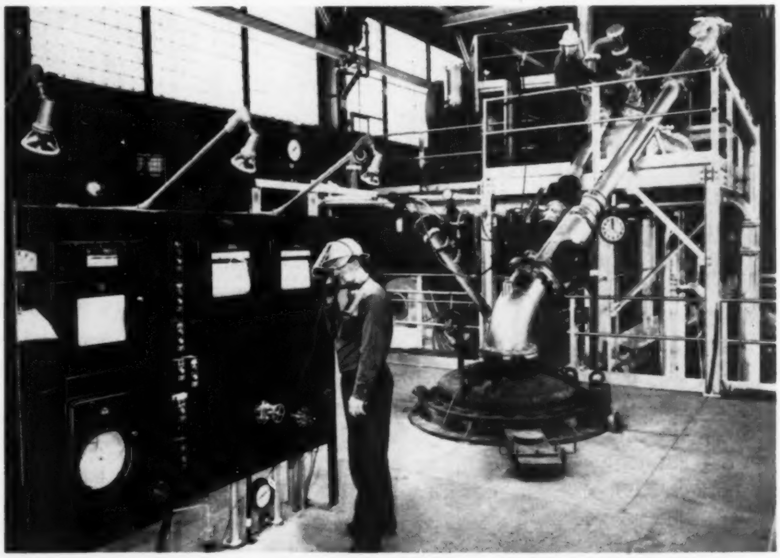
American Hoist & Derrick Co., St. Paul, Minn., has formed a Custom Casting Division. Heading the sales end of the new division is J. D. Johnson, formerly director of foundry research for Archer Daniels Midland Co. H. M. Patton will be in charge of custom casting production. He was foundry superintendent for American Hoist for the past 12 years.

Mercast Corp., New York, and **Guest, Keen and Nettlefolds Ltd.,** London, Eng., have jointly formed a Britsh company, **Mercast (Great Britain) Ltd.,** to license the use of the Mercast process to firms in the United Kingdom and the British Commonwealth (excluding Canada).

The first nuclear reactor for industrial research will be established at **Armour Research Foundation of Illinois Institute of Technology,** Chicago. Plans are being submitted to the Atomic Energy Commission for consideration of the design, building plans, and schedule of operation.

Elwell-Parker Electric Co., Cleveland, has announced the appointment of the **Landes, Zachary and Peterson Co.,** Denver, Colo. as its new distributor to cover the states of Colorado, Wyoming, Utah and New Mexico.

National Pressure Cooker Co. (Canada) Limited, Wallaceburg, Ontario has changed the firm name to **National PRESTO Industries of Canada, Ltd.**



A new process for the production of titanium metal, developed by Union Carbide and Carbon Corp., is shown here in operation on a pilot-plant scale in the corporation's metals research laboratories in Niagara Falls, N. Y. The process will be launched commercially in a new plant at Ashtabula, Ohio, which will produce at least 7500 tons of metal a year.

AIR POLLUTION

IS AS CLOSE AS YOUR PARKING LOT!

Dust Covered Cars Offer *VISUAL PROOF* That a Dust Control Problem Is Just *HALF LICKED*

TAKE a look at the cars in your parking lot. They quickly show the effects of settled materials, many of which damage automotive finishes in surprisingly short periods of contact time.

If such dust is a source of irritation and expense to your employees, you can be sure that it is equally offensive to the surrounding neighborhood.

It's a problem resulting from half-way measures—solving inside dust problems at the expense of outside areas.

The solution is *complete* dust control as provided by AAF equipment. Dynamic precipitators, hydrostatic precipitators, dry centrifugals, fabric arresters—you'll find them all in the AAF line. There's a unit to cope with *any* type of dust—*completely.*

Let your parking lot be the metering device for dust conditions in your plant area. Your local AAF representative will check your dust sources and recommend effective, economical means of control. Call him today or write us direct.

AAF EQUIPMENT DOES THE *COMPLETE* JOB—INSIDE *AND* OUT.

AAF

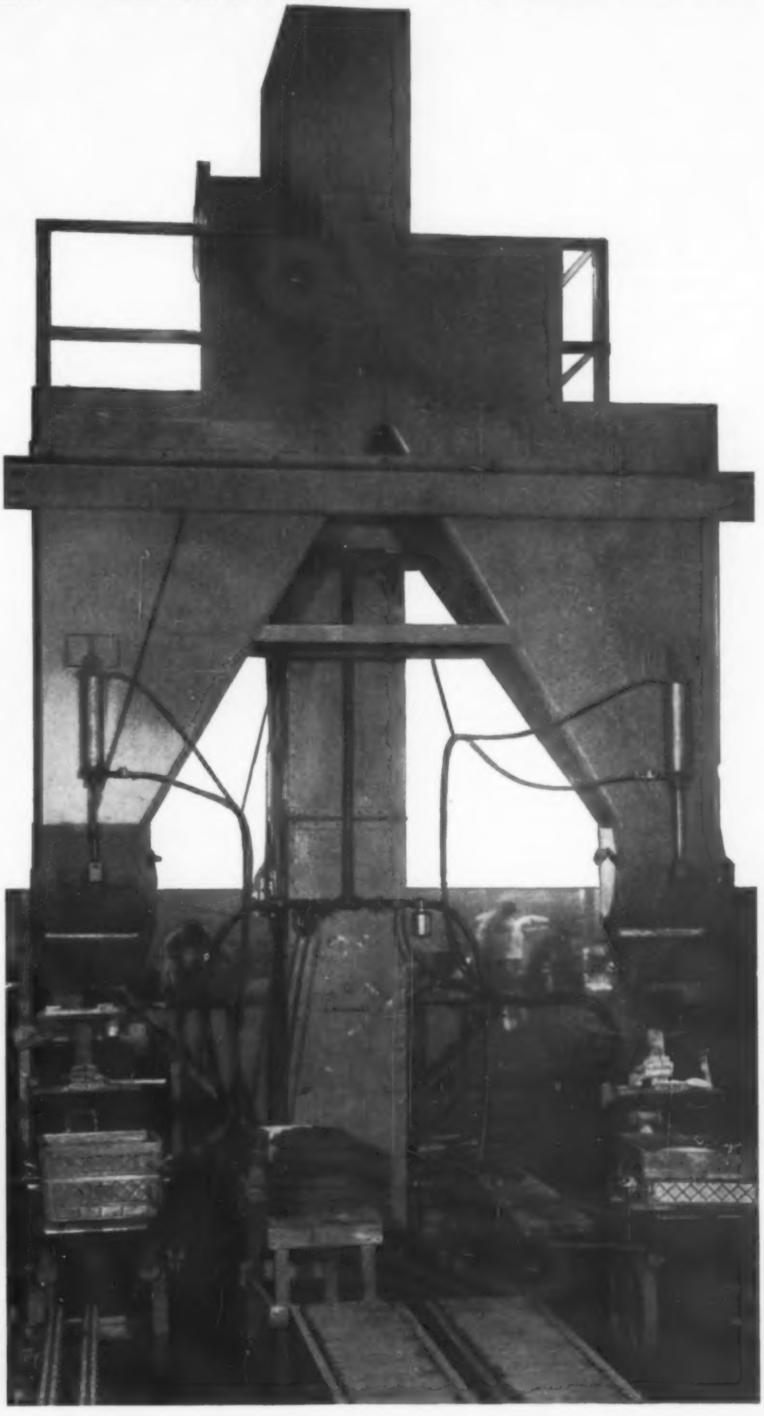
American Air Filter

COMPANY, INC.

American Air Filter of Canada, Ltd., Montreal, P. Q. • 104 Central Avenue, Louisville 8, Kentucky

For more data, circle No. 671 on postage-free Reader Service card, p. 17 or 18

The SUPER HANDY SANDY

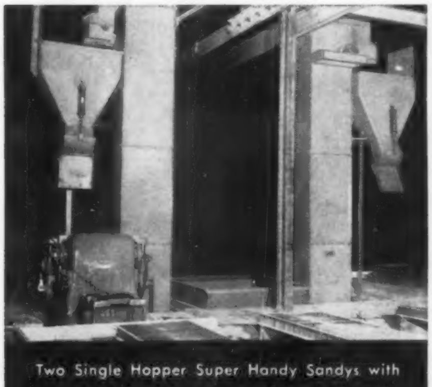


A HIGH CAPACITY INDIVIDUAL-FLOOR SAND HANDLING UNIT

fills large flasks in seconds— that before took several man hours

This unit can handle up to 50 tons of sand per hour into overhead hoppers where it is available to the molders without effort. Super Handy Sandy's big sand capacity makes it ideally suited for use with large molding machines such as rollover machines, bumpers, and automatic molding machines.

The savings possible through use of the Super Handy Sandy are almost unbelievable. In one installation mold production on large molds has been increased 150% due to savings in shovel time alone. One molder can fill more molds than several men with shovels. He merely operates an air valve and the sand falls into the flask. Thus he spends more time making molds and less time getting ready.



Two Single Hopper Super Handy Sandys with a common feed hopper supplying both units.

A copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire, or phone

NEWAYGO engineering company
NEWAYGO, MICHIGAN

Manufacturers of Newaygo Mold Handling, Sand Handling and Conditioning Equipment

Name Nominating Committee

Nominating Committee to select officers and directors for election at the 1955 Annual Business Meeting of AFS was chosen August 9 at a special meeting of the Executive Committee. Five committee members were named from lists submitted by chapters eligible this year to suggest members. These five, together with the two immediate past presidents form the Nominating Committee which will meet December 9 in Chicago to nominate a president, vice-president, and six directors, endeavoring, as prescribed by the By-Laws, "to provide equitable and constant regional representation, and . . . representation for the several branches of the castings industry."

Members of the Nominating Committee are:

Past President Collins L. Carter (1953-54), Albion Malleable Iron Co., Albion, Mich., *chairman.*

Past President I. R. Wagner (1952-53), Indianapolis, Ind.

Robert A. Epps, Stoller Chemical Co., Akron, Ohio. Representing Region 1, Chapter Group E-Canton and Supplies.

Karl G. Presser, Gray Iron Research Institute, Columbus, Ohio. Representing Region 2, Chapter Group G-Central Ohio Chapter and Gray Iron.

D. C. Zuege, Sivyer Steel Casting Co., Milwaukee. Representing Region 3, Chapter Group L-Wisconsin Chapter and Steel.

A. L. Hunt, National Bearing Div., American Brake Shoe Co., St. Louis. Representing Region 4, Chapter Group N-St. Louis District Chapter and Brass & Bronze and Light Metals.

S. D. Russell, Phoenix Iron Works, Oakland, Calif. Representing Region 5, Chapter Group Q-Northern California Chapter and Gray Iron.

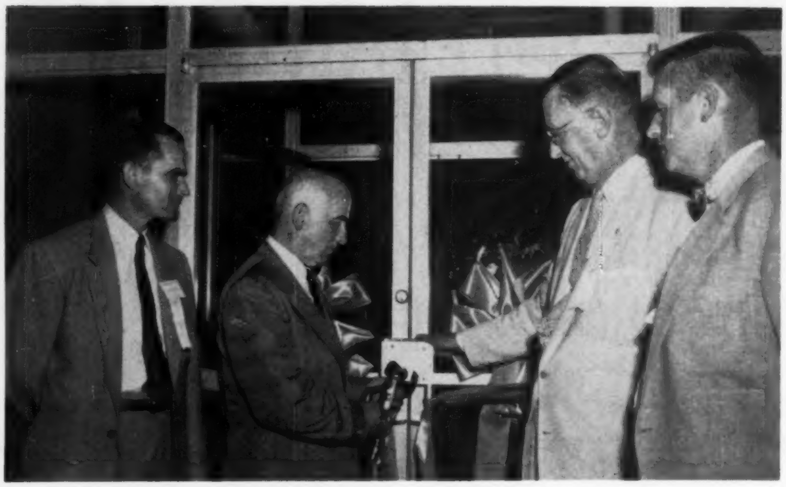
MFS Opens Safety Contest

Writers of the best letters on "Accident Prevention" will share in four cash prizes totalling $250 to be awarded by the Malleable Founders' Society. Deadline for letters is November 30; contest is open to employees of M.F.S. member companies. Winner will be introduced at the M.F.S. semi-annual meeting in Cleveland, January 1955, and his letter will appear in *Foundry*.

Release Chemical Methods

An Air Force research report entitled "Development of Composite Spectrophotometric Procedures for the Analysis of Low-Alloy Steels and of Aluminum and Its Alloys" has recently been made available by the U.S. Department of Commerce. Procedures for determining the constituents of low-alloy steels and of aluminum and its alloys from a single sample are outlined. The last half of this report is set up as a working laboratory manual.

Copies may be obtained by writing the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C. Code number of report, PB 111287. Enclose $1.50.



A. G. Lauzon, president, Buckeye Tools Corp., second from left, is shown cutting metal ribbon with a standard production model Buckeye shear at the dedication of the firm's new plant in Dayton, Ohio. Watching are, left to right: Earl Hamilton, secretary, Hal Gummere, vice-president and general manager, and E. E. Reeves, treasurer. An open house was held the day following the official dedication and invitations were extended to residents of the community in which the new plant was built.

Members and guests attending the September meeting of the Washington Chapter, from left, William A. Shaug, South Seattle Foundry Co.; Harold R. Wolfer, Puget Sound Naval Shipyard; guest speaker Clifford E. Wenninger, National Engineering Co.; James N. Wessel, Puget Sound Naval Shipyard; S. J. Hatchett, Canada Metal Co., Ltd.

Chapter News

Castings Clinic Scheduled for Omaha

Foundrymen of Nebraska, western Iowa, western Missouri, and adjacent areas will meet Friday, November 12, at the Rome Hotel, Omaha, for a Castings Clinic. Sponsored by the AFS Technical Dept. and the Corn Belt Chapter, the all-day meeting is open to all interested ferrous and non-ferrous foundrymen.

There is no registration fee and no limit on the number of men a foundry may send. Texts and reference material will be provided for further study.

Theme of the clinic is "Means Toward Better Castings." Object is to assist operating foundrymen and metallurgists in solving technical problems through information developed for production of better castings. Reasons for and avoidance of common casting defects found on actual production castings will de discussed.

The clinic will be conducted by Hans J. Heine, AFS technical director, with the assistance of a panel of foundry experts. Program for the Castings Clinic, which features use of a number of visual aids, follows:

FRIDAY, NOVEMBER 12

Morning Sessions: *"Means Toward Better Castings,"* conducted by the AFS technical director.

9:00 am..*"Gating and Risering"*
Fundamentals of Good Gating Design.
AFS color-sound motion picture: *"Effect of Gating Design on Casting Quality."*

10:00 am..*"Casting Design"*
Fundamentals of Good Casting Design.
Conversion to Castings.
Redesign for Better Castings.
Product Development.

11:00 am..*"Non-Destructive Testing and Quality Control."*
Brittle Lacquer Technique and Experimental Stress Analysis.
X-Ray, Radioactive Cobalt, etc.
Quality Control.

12:15 pm..Lunch.

Afternoon Sessions: *"Discussion of Casting Defects"* by a panel of experts with AFS technical director as moderator.

1:45 pm..*"Ferrous Castings"*
Outline of Causes of Principal Defective Conditions. Panel Discussion of Actual Case Histories.

3:10 pm *"Non-Ferrous Castings"*
Outline of Causes of Principal Defective Conditions. Panel Discussion of Actual Case Histories.

4:40 pm..Discussion of Literature References, Movies, Slide Films, Bibliographies, and other material available through AFS.

Anyone interested in attending the Castings Clinic may register and obtain additional information by writing to: Hans J. Heine, Technical Director, American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill.

Twin City

The September meeting of the Twin City Chapter was held at the Covered Wagon, Minneapolis. Guest speaker was J. D. Holtzapple, Continental Foundry & Machine Co., East Chicago, Ind. His subject was *"Safety and Hygiene in the Foundry."* He outlined a safety program based on interdepartmental meetings, discussions, and planning periods for improving and maintaining safety practices among chainmen and cranemen. Employee cooperation, Mr. Holtzapple stated, was easily secured when they realized the company was vitally interested in their safety. He said this cooperative thinking and planning program resulted in a more thorough foreman training program. To illustrate examples of unsafe foundry practices. Holtzapple showed candid photographs taken during normal working hours.

James Ward, Brom Machine & Foundry Co., Winona Minn., received $25 from the Twin City Chapter for winning first place in gray iron molding in the local competition of the National AFS Apprentice Contest. Gus Degler, formerly with American Hoist & Derrick Co., St. Paul, and now serving in the U. S. Army, was awarded $25 for winning first place in the local patternmaking division of the contest.

D. B. Fulton, Northern Malleable Iron Co., St. Paul, Educational Committee chairman of the Twin City Chapter for the coming year, presented the program of the committee for the 1954-55 season. He outlined a plan for tying students and apprentices more closely to the chapter through a program of student night activites, plant visitations, chapter members speaking at local high schools, and broad publicity for the national AFS Apprentice Contest.

It was announced that the Technical Committee has been re-activated this year under the direction of Nathan Levinsohn, Minneapolis-Moline Co., Minneapolis.—*R. J. Mulligan.*

Southern California

A social hour and dinner, attended by 88 members and guests, preceded the opening meeting of the 1954-55 season of the Southern California Chapter held at the Rodger Young Auditorium, Los Angeles.

Clifford Wenninger, National Engineering Co., Chicago, was guest speaker. His topic was *"Digging Into Sand Fundamentals."* Mr. Wenninger discussed sand grain distribution, and stated that grain distribution is the principal sand control tool of the foundryman. He pointed out

Clifford E. Wenninger, guest speaker at the September meeting of the Oregon Chapter speaking on "Digging Into Sand Fundamentals." Photo Courtesy Norman E. Hall, Electric Steel Foundry Co.

that good grain distribution is a prerequisite for present day strength and permeability requirements.—*W. G. Stenberg.*

Wisconsin

Two hundred and twenty members and guests attended the September meeting of the Wisconsin Chapter, held in the Schroeder Hotel, Milwaukee, featuring a program of simultaneous sectional meetings on malleable, steel, gray iron, pattern, and non-ferrous.

MALLEABLE. Chairman Fred E. Katzenski, International Harvester Co., Waukesha, Wis. Speaker Harry J. O'Neil, International Harvester Co., Chicago. *"What a Customer Expects from a Producer of Malleable Castings."*

STEEL. Chairman E. G. Tetzlaff. Speaker C. F. Christopher, Continental Foundry & Machine Co., East Chicago, Ind., *"The Effect of Pouring Temperature on the Soundness and Physical Properties of Steel Castings."* Highlight of the session was an explanation on how the control of chemical composition and pouring temperature has direct bearing on control of gas contained in finished castings. The speaker also discussed research being done on high temperature impact testing to determine the hot tear zone in order to reduce the number of hot tears.

GRAY IRON. Chairman Philip C. Rosenthal, University of Wisconsin. Speaker J. M. Crockett, Air Reduction Co., New York, *"Changes in Iron Structure and Composition by Means of Carbide Injection."* Mr. Crockett discussed the application of a newly designed tip for injection of carbide into the molten ladle by means of a carrier gas, which results in a change of properties of gray iron. Sulphur can be economically reduced to less than .02%, which produces an iron of low chill depth and lower Brinell hardness for the same tensile strength. The iron produced by this method can also serve as a base for nodular iron.

PATTERN. Chairman H. W. Stokes, Waukesha Foundry Co., Waukesha, Wis. Speaker Clarence Schmidlin, Accurate Match Plate Co., Chicago, *"Pressure Cast Plates and Core Boxes."* Mr. Schmidlin discussed highlights in nonferrous plaster casting. Silicon and manganese core boxes were exhibited, and Mr. Schmidlin stated that they might replace present iron and aluminum core boxes.

NON-FERROUS. Chairman Otto Sadofsky, Kenosha Brass & Aluminum Foundry. Speaker W. B. George, R. Lavin & Sons, Inc., Chicago, *"Brass and Bronze Foundry Practice."* Mr. George conducted a detailed discussion on foundry practices, and an audience participation feature on sands, heading, and gating, cores and melting proctices.—*W. R. Matschulat.*

At the September meeting of the Twin City Chapter a $25 award was presented to James Ward, Brom Machine & Foundry Co., second from left, for winning first place in gray iron molding from the Twin City area in the AFS National Apprentice Contest. Also pictured, left to right, Leo Brom, Brom Machine & Foundry Co.; J. W. Costello, American Hoist & Derrick Co.; William Armstrong, Brom Machine & Foundry Co.

Northern California Chapter program chairman Clayton D. Russell, Phoenix Iron Works, left, greets Clifford E. Wenninger, National Engineering Co., Chicago, guest speaker at the Chapter's September meeting. Right, Chapter chairman, John Bermingham, E. F. Houghton Co., San Francisco.

Central Illinois

The annual fish fry of the Central Illinois Chapter was held in September at the 497th Engineer's Club near Groveland, Ill. Festivities included games, movies, and refreshments. Maurice Elwood and Dean Morehead, winners in the horseshoe contests, received prizes of outdoor charcoal burners.—*C. J. Turner.*

Northeastern Ohio

Northeastern Ohio Chapter opened the 1954-55 season in September with a technical meeting attended by 200 members and guests at Tudor Arms Hotel, Cleveland.

Speaker was Lester B. Knight, Lester B. Knight & Associates Inc., Chicago. Mr. Knight's subject was *"Modernization of Foundries."* He defined modernization as the application and successful use of the organization, methods, facilities, and controls that permit maximum production with minimum man-hours and materials consumption and result in an adequate return to labor, management, and owners. Foundry problems, Mr. Knight stated, are seldom alike. They vary not only with foundry size and type of product, but also with the people in the industry. As a result, modernization is a new and different problem in almost every foundry.

Knight pointed out that more business does not mean more profits unless overhead and manufacturing costs are held down so that they do not increase out of proportion to the increased production. Overtime and excess scrap and overhead personnel lead to trouble and are the product of a failure to modernize thinking, methods, and facilities.

Cost of mechanization must be justified. It should be amortized in three years, or in five at the most. A completely new shop should be able to save enough from its mechanization to pay for the entire cost of the installation in ten years. Organization and direction are necessary to proper utilization of equipment.—*Jack C. Miske.*

Oregon

"Digging Into Sand Fundamentals" was the subject of a talk by Clifford E. Wenninger, National Engineering Co., Chicago, at the Oregon Chapter's first meeting of the season held September 18. The chapter met at the Columbia Athletic Club, Portland, Ore.

Mr. Wenninger said the science of agglomeration is more than 50 years old and has been employed by the ceramics industry and related fields for many years. The foundry industry apparently overlooked this fact, believing that sand problems were encountered only in foundries.

Proper distribution and packing are the most important features of good sand, he stated. Distribution is even more important than clay content before additions are made, and a four-screen sand gives good results. Wenninger suggested that steps should be taken toward changing present AFS sand numbers. In the current numbering system, he said, sev-
continued on page 78

F. E. Katzenski, left, and H. J. O'Neil, speaker at the malleable session of the October meeting of the Wisconsin Chapter.

Chapter Chairmen

John A. Van Haver, foundry manager, Sealed Power Corp., Muskegon, Mich., is chairman of the Western Michigan Chapter of AFS. Mr. Van Haver began his foundry career with Grand Haven Brass Foundry from 1935 to 1941, followed by four years with Sealed Power Corp. His employment background also includes U.S. Pipe & Foundry Co., and Worthington Corp. In 1949 he re-joined Sealed Power Corp. as foundry manager. Van Haver is vice-chairman of the 1954 Michigan Regional Foundry Conference.

Duncan M. Wilson, chairman, Rochester Chapter of AFS, is plant superintendent, Engineered Castings Div., American Brake Shoe Co., Rochester, N. Y. Following graduation from Massachusetts Institute of Technology, Mr. Wilson joined American Brake Shoe Co., American Manganese Steel Div., as metallurgical assistant. He advanced to assistant metallurgist in 1946, to metallurgist in 1948, and was promoted to his present position in 1952. Mr. Wilson is also a member of A.S.M.

Chapter News

continued from page 77

eral sands of various distributions could have the same fineness number.

He noted that surface films hold sand grains together; it is possible to cast metal in sand mulled with water alone. Fillers such as silica flour increase surface area and give more green strength. Lubricants aid packing. Pitches and resins artificially create a round grain sand, and are temporarily helpful, but without a good reclamation system, control is a problem. Because reclamation tends to round the sand grains, reclaimed sands are in many instances superior to original sand.

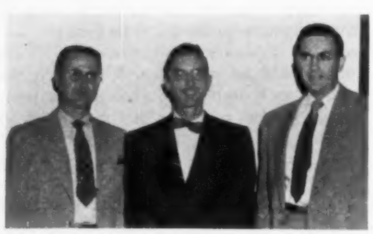
Wenninger stressed the importance of mulling as opposed to simple mixing. He said that mulling action predisposes the aggregate material to uniform packing when properly distributed material is introduced into the muller. Mulling action coats the grains. He pointed out that one cubic foot of 400-mesh material contains 1.8 acres of surface area. He discussed mulling in a vacuum to prevent aggregate from adsorbing an air film.—*Bill Walkins.*

Central Michigan

The September meeting of the Central Michigan Chapter was held at the Jackson Country Club, Jackson, Mich. AFS Past-President Collins L. Carter, Albion Malleable Iron Co., Albion, Mich., briefly reviewed highlights of the Society for the past year, and introduced the speaker of the evening, AFS Technical Director Hans J. Heine. Mr. Heine spoke on *"The Foundryman's Most Unused Tool."* Pointing out the present trend toward over-specialization in education and in industry, Heine emphasized the need for a broad, liberal educational system, and urged the cultivation of original, creative thinking.

Industry, if it is to progress, must have leaders who have been trained to think and who are willing to experiment or to try new methods and products, he stated. Heine explained how progressive foundrymen could, by redesign, conversion, and the application of experimental stress analysis, recapture lost business and develop new applications for castings.
—*Lewis Heisler.*

continued on page 80



Left to right: J. J. Broecker, P. C. Rosenthal, and J. M. Crockett at the gray iron session of the October meeting of the Wisconsin Chapter.

Chapter Chairmen

Fred J. Rutherford, chairman of the Ontario Chapter of AFS for 1954-55, is sales manager, Refractories Engineering & Supplies, Ltd., Hamilton, Ont. After graduating from business college, Mr. Rutherford was employed by the Anglo American Oil Co., Ltd. from 1935 to 1939, and National Refractories Ltd. from 1945 to 1946. In 1946 he joined National Engineering & Supplies as a salesman, advancing to his present position of sales manager. Rutherford is a member of A.S.M. and Canadian Ceramic Society.

Lloyd H. Canfield, chairman, Mo-Kan Chapter of AFS, is owner of Canfield Foundry Supplies & Equipment, Kansas City, Kans. Mr. Canfield attended the University of Kansas City, majoring in business administration and pre-law. He worked for a short time in the aircraft industry before entering the U.S. Navy Air Force as a pilot instructor in 1942. Before forming his own company in 1948, he was employed by Fred Canfield Foundry Sands, as a part-time general assistant.

Speaker's table at the September meeting of the St. Louis Chapter, left to right, R. E. Hard, St. Louis Coke & Foundry Supply Co.; Webb L. Kammerer, Midvale Mining & Mfg. Co.; N. Peukert, Carondelet Foundry Co.; guest speaker Tom C. Muff, Sorbo-Mat Process Engineers; F. J. Boeneker, Bronze Alloys Co.; George L. Mitsch, A.C.F. Industries; John O'Meara, Banner Iron Works; Paul E. Retzlaff, Nordberg Mfg. Co

Chapter News

continued from page 78

Washington

Highlight of the Washington Chapter's September meeting which assembled in the Gowmar Hotel, Seattle, was a talk on *"Digging Into Sand Fundamentals"* by Clifford E. Wenninger, National Engineering Co., Chicago. Mr. Wenninger stated that the best method of setting up a sand department is to make a good casting, and then set standards for the sand that produced the good casting.

Wenninger discussed mixing of aggregates, and the addition or bonding materials added to sands. Two types of agglomerating processes were presented. First, plastic agglomeration, achieved through additions of clays and other binders. Second, systematic agglomeration which results in development of strength through redistribution and alignment of the grains.

He discussed four types of bonding agents: water-soluble bonds such as resin; water-absorbent bonds such as clays and cereals; fillers like silica flour; lubricant bonds such as core oils, pitches, and tars. Wenninger pointed out that one foundry has successfully used motor oil in place of core oil, since in that application the oil was used only as a lubricant.

In conclusion, Wenninger stressed the value of a sand testing department, and stated that the primary purpose of this department is to retain control when a good process is sound. The best laboratory tests, he said, would be a duplication of actual foundry conditions.—*William K. Gibbs.*

Eastern New York

Warner B. Bishop, Archer-Daniels-Midland Co., was guest speaker at the September meeting of the Eastern New York Chapter held in Pannetta's Restaurant, Menands, N. Y. Mr. Bishop spoke on *"The D Process for Shell Molding."* He prefaced his discussion by stating he was not trying to oversell the process and that the D Process, like shell molding, had its special place in the foundry. He described the steps in the D Process as blowing a mixture of fine, dry sand and an oleo-resinous binder through a pattern mounted on the head of a core blowing machine into a contoured dryer. The shell produced is baked in a conventional core oven at 425 to 500 F for approximately 30 min. Fly ash was mentioned as an excellent release material. Bishop also gave comparative materials cost for shell, D Process, and green sand.

In concluding, Bishop said the advantages of the D Process include: better finishes and closer tolerances than green sands; high green strength; cheaper materialwise than shell molding. Also, because cold metal patterns are used, there are no pattern expansion and distortion problems as encountered in shell molding where patterns are heated to temperatures ranging from 450 to 650 F.—*L. J. DiNuzzo.*

St. Louis

Tom C. Muff, Sorbo-Mat Process Engineers, St. Louis, was guest speaker at the September meeting of the St. Louis Chapter. Speaking on *"Some Phases of Foundry Control,"* Mr. Muff defined the classification of casting defects due to sand conditions, and placed all such defects under the heading of either high hot strength and/or high expansion, or low hot strength and/or low expansion. He pointed out that the sand properties causing these two basic conditions are directly opposite. Therefore, the sand must be a compromise between the two extreme conditions if casting defects caused by faulty sand are to be kept at a minimum.

Muff went on to a discussion of recent improvements in cupola design. On the subject of cupola practice, he discussed coke problems and acid slag calculations. —*Jack Bodine.*

Tri-State

Highlight of the September meeting of the Tri-State Chapter, which met in the Alvin Hotel, Tulsa, Okla., was a talk entitled *"Core Sand"* by O. Jay Myers, Archer-Daniels-Midland Co., Minneapolis. Mimeographed lists of technical questions on the variables in core sand were passed out to the audience. From these questions, Mr. Myers conducted an active group discussion, and supplied information and experimental data on core oils, resins, moisture content, and baking temperatures in answer to the questions. Myers concluded his talk by passing out answer sheets.

The September meeting was also Past Chairmen's Night. A round of applause was given as the current chairman, Don McArthur, introduced each past chairman of the chapter.—*Albert M. Fisher.*

Toledo

The annual stag outing of the Toledo Chapter was held in June at the Adams Conservation Club, Toledo, Ohio. Highlights of the outing included games and refreshments, concluded with a dinner. —*C. E. Eggenschwiler.*

Other Organizations

Reading Foundrymen's Association

Three seminars were featured at the September dinner meeting of the Reading Foundrymen's Association in the Berkshire Hotel, Reading, Pa. Topics discussed were "Iron Foundries," Steel," and "Brass and Bronze." James Woodward, president, was in charge of the session.

James Stewart, Reading, Pa., was discussion leader of the "Iron Foundries" group and Rex Harrison, Jr., was technical chairman. Philip Grimard, Lansdowne, Pa., led the discussion on "Steel" and Daniel Heckman, Reading, Pa., was technical leader.

The "Brass and Bronze" discussion was led by Roger J. Keeley, Philadelphia, with Edward Harkness, Reading, Pa., as technical chairman.

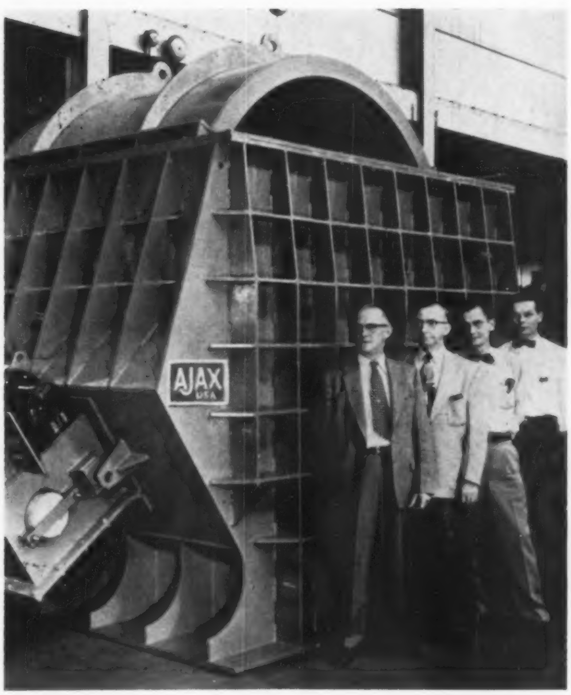
Left, Eastern New York chapter chairman William C. Stevenson, Rensselaer Valve Co., introducing Warner B. Bishop, Archer-Daniels-Midland Co., guest speaker at the Chapter's September meeting.

Participants in the horseshow contest at the Toledo Chapter's annual stag outing held in June at the Adams Conservation Club, Toledo.

New G. E. Experimental Foundry

Foundry specialists Jack Bolt, left, and Hugh Taylor, are shown in the new experimental shell molding foundry, set up by General Electric Chemical Materials Dept., Pittsfield, Mass., to provide consulting service for customers on shell molding problems. At left, Jack Bolt adds a charge to the induction furnace, while Hugh Taylor removes a finished shell mold from its pattern.

Ajax Manufactures 1000th Furnace



Ajax Engineering Corp., Trenton, N. J., recently celebrated production of its 1000th low frequency electric induction melting furnace. In picture, from left to right, are John R. Anderson, superintendent; Wilfred Gray, assistant superintendent; Lloyd Hoff, chemical engineer, and John White, mechanical engineer. The furnace, shown at the plant ready for shipment, weighs 50,000 lb and has a capacity of 31,000 lb of metal.

Convention Program

continued from page 67

the theme of correlation of laboratory and pilot plant data with actual foundry practice, according to O. Jay Myers, Archer-Daniels-Midland Co., Minneapolis, Sand Div. program chairman. First speaker (Monday, May 23, 2:00 pm) is S. C. Massari, Foundry Div., Hansell-Elcock Co., Chicago, former AFS technical director. He will tell how to put available technical information to work in a foundry. Louis Pedicini, Process Development Section, General Motors Corp., Detroit, will describe GMC's new foundry pilot plant. It is hoped he will be able to make the premiere showing of a motion picture on the operation.

Monday evening at 8:00 pm the first of two sand shop course sessions will be staged. Discussion subject will be *"Fitting Sand Control to Your Foundry."*

The Tuesday morning sand session (starts 9:30 am) will feature practical application of the field work done by the Sand Div.'s two most active committees. H. W. Meyer, General Steel Castings Corp., Granite City, Ill., will show how casting scabs can be predicted through dilatometer tests. R. L. Doelman, Miller & Co., Chicago, will describe correlation between casting defects and sand tests.

The 2:00 pm Tuesday session will lead off with C. A. Sanders, American Colloid Co., Chicago, and Nathan Levinsohn, Minneapolis-Moline Co., Minneapolis, showing that all casting defects are not caused by sand. They will be followed by W. R. Jennings, John Deere Tractor Works, Waterloo, Iowa, who will show how sand can cause trouble in a foundry.

The second sand shop course session at 8:00 pm Tuesday, *"Sand Preparation Without Guesswork"* will be preceded by the annual Sand Div. dinner.

The single sand session scheduled for 2:00 pm Wednesday, May 25, will last the entire afternoon to allow time for full discussion of data developed by Charles Locke, West Michigan Steel Castings Co., Muskegon, Mich., and his Standard Test Patterns Committee.

On May 26, the Sand Div. will present work soon to be correlated under its Basic Concepts Group. Data on sand grain grouping fundamentals will be presented by Carl Ludwig, Bonnot Co., Canton, Ohio, and C. E. Wenninger, National Engineering Co., Chicago. Prof. V. D. Frechette, Alfred University, will speak on microscopy of molding sands. G. J. Grott, Unitcast Corp., Toledo, Ohio, will present a paper on bond control.

At the April meeting of the American Foundrymen's Society's Board of Directors, a recommendation was approved to continue memberships of men who have retired from active service in the foundry industry at a reduced dues rate of $10 per year.

dust and fume ...no problem

in famous foundries

served by KIRK and BLUM dust and fume control systems

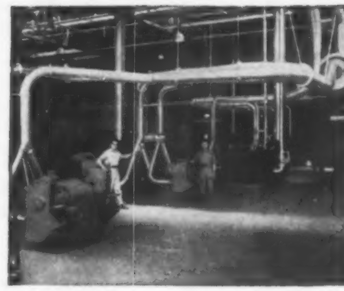
No one expects to eat lunch off a foundry floor, but there is a difference between a "clean" and a "dirty" foundry. Important differences too, in worker efficiency, maintenance and housekeeping costs, plant-community relations.

If dust or fumes are a problem in your foundry, call on Kirk & Blum for the complete job—design, fabrication and installation. From 47 years of experience, Kirk & Blum Engineers will be able to show you comparable problems efficiently solved the economical way.

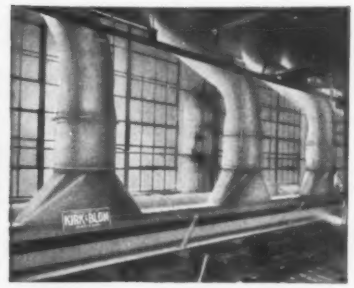
For illustrated booklet and further details, write today to: The Kirk & Blum Mfg. Co., 3108 Forrer Ave., Cincinnati 9, Ohio.

KIRK AND BLUM

DUST AND FUME CONTROL SYSTEMS



● **GRINDING**
In the chipping and grinding departments, Kirk & Blum systems control dust; dry collection.



● **POURING**
"Moving Floor" pouring station. Forty-foot-long Kirk & Blum hood effectively removes fumes as they are formed.

● **SHAKE-OUT**
Clean air flows over the shake-out grate, removing dust below the operators' breathing level; wet collection.

● **SAND HANDLING**
Equipment is efficiently exhausted by a Kirk & Blum system; wet collection.

Obituaries

William H. Kenealy, 92, died in Los Angeles in September. He was formerly superintendent of the National Malleable & Steel Castings Co., Chicago.

Seward H. French, Jr., 46, died of polio in Pittsburgh, Pa., in September. He was a vice-president of Crucible Steel Co. of America.

Lucien I. Yeomans, president of Lucien I. Yeomans, Inc., Chicago, died in August.

Charles H. Stokesbury, Sr., died recently. He was treasurer of the Derby Castings Co., Seymour, Conn.

Arthur E. Jones, president and founder of the Arthur E. Jones Co., Syracuse and Buffalo, N. Y., died in September. He had represented the Ajax Flexible Coupling Co., Inc., Westfield, N. Y., for 30 years and had been on the Ajax board of directors for the past 10 years.

Percy H. Wilson, 69, died recently. Since 1943 he was deputy managing director Stanton Ironworks Co. Ltd., Nottingham, England. He was president of the Institute of British Foundrymen in 1947 and in 1942 received the E. J. Fox medal of that society in recognition of his work in production and development of centrifugally cast iron pipe. He was president of the British Cast Iron Research Association in 1948-50.

Daniel C. Eagan, 71, cost analyst, Dodge Steel Co., Philadelphia, died recently.

Ernest Lancashire, manager of foundry sales, Union Metal Mfg. Co., Canton, Ohio, died recently.

F. Lloyd Woodside, 58, president of Park Chemical Co., Detroit, died recently.

James D. Magirl, president of Magirl Foundry & Furnace Co., Bloomington, Ill., died recently.

Magnesium Group Will Meet

Tenth annual meeting of the Magnesium Association is scheduled for November 15-17 at Hotel Chase, St. Louis, Mo. with "Magnesium in Use" as a theme, the program covers casting, fabricating, finishing, and application. Daily sessions open to all without charge include nine technical talks. Magnesium casting is covered the morning of November 15. Other sessions cover welding, plating and ceramic coatings and use of magnesium in missiles.

Luncheon speakers the first and second days, respectively, are Arthur Compton, chancellor emeritus, Washington University, St. Louis, speaking on "*Goals for a Changing World*," and Frank Nichols, Nichols Wire & Aluminum Co., whose subject is "*Selling a Product Buyers Think They Don't Want*." The third day has been set aside for a visit to the new Dow Chemical Co. plant at Madison, Ill., across the river from St. Louis.

Calendar of Future Meetings and Exhibits

November

1-5 . . American Society for Metals
International Amphitheater, Chicago. National Metal Exposition.

3-4 . . Investment Casting Institute
Congress Hotel, Chicago. Second Annual Meeting.

3-5 . . Steel Founders' Society
Carter Hotel, Cleveland. Annual Technical and Operating Conference.

3-6 . . American Council of Commercial Laboratories
Roosevelt Hotel, New Orleans, La. Annual Meeting.

6 . . Metropolitan Brass Founder's Association
Brass Rail, New York. Forty-Fourth Anniversary Celebration and Dinner Show Dance.

10-12 . . Industrial Management Society
Sherman Hotel, Chicago. 18th Annual Time and Motion Study and Management Clinic.

11-12 . . Gray Iron Founders' Society
The Homestead, Hot Springs, Va. Annual Meeting.

12 . . Castings Clinic
Rome Hotel, Omaha, Neb. Sponsored by AFS Corn Belt Chapter and AFS Technical Dept.

15-17 . . Magnesium Association
Hotel Chase, St. Louis. Tenth Annual Meeting.

25-26 . . Institute of Metals
London, England. General Meeting.

29 . . First International Automation Exposition
242nd Coast Artillery Armory, New York.

December

1-3 . . National Association of Manufacturers
Waldorf-Astoria Hotel, New York, N. Y. Annual Meeting.

1-4 . . American Institute of Mining & Metallurgical Engineers
Hotel William Penn, Pittsburgh, Pa. Electric Furnace Steel Conference.

1-5 . . American Welding Society
International Amphitheater, Chicago Annual Fall Meeting.

1955

January

24-27 . . Plant Maintenance & Engineering Show
International Amphitheatre, Chicago.

February

10-11 . . Wisconsin Regional Foundry Conference
Hotel Schroeder, Milwaukee. Sponsored by AFS Wisconsin Chapter.

14-17 . . Industrial Ventilation Conference
Michigan State College, East Lansing, Mich.

17-18 . . Southeastern Regional Foundry Conference
Tutwiler Hotel, Birmingham, Ala. Sponsored by AFS Birmingham and Tennessee Chapters.

March

9-10 . . Foundry Educational Foundation
Hotel Cleveland, Cleveland. College-Industry Conference.

14-15 . . Steel Founders' Society of America
Drake Hotel, Chicago. Annual Meeting.

14-18 . . American Society of Tool Engineers
Shrine Auditorium, Los Angeles. First Western Industrial Exposition.

26-27 . . California Regional Conference
Los Angeles, Calif. Sponsored by AFS Northern California and Southern California Chapters.

28-Apr. 1 . . American Society for Metals
Pan-Pacific Auditorium, Los Angeles. Ninth Western Metal Congress and Western Metal Exposition.

April

18-19 . . Third National Air Pollution Symposium
Pasadena, Calif.

May

23-27 . . American Foundrymen's Society
Houston, Texas. 59th Annual Convention. Non-Exhibit.

June

16-18 . . Malleable Founders' Society
The Greenbrier, White Sulphur Springs, W. Va. Annual Meeting.

20-26 . . International Foundry Congress
London, England. Host: The Institute of British Foundrymen.

Chapter Meetings

November

1 . . Chicago

Chicago Bar Association, Chicago. Robert E. Kennedy Scholarship Night. Round Table Meetings. Gray Iron and Steel Division: Arthur Clem, American Colloid Co., "*Manufacture of Bentonite;*" E. W. Claar, Eastern Clay Products Dept., International Minerals & Chemical Co., "*Uses of Bentonite.*" Malleable Division: Representative, Central Foundry Div., General Motors Corp., "*Molding Problems.*" Non-Ferrous and Pattern Division: Gating and Risering Panel: W. B. George, R. Lavin & Sons, Inc., C. K. Faunt, Christensen & Olson Foundry Co., E. E. Henry, Hammond Brass Works, S. H. Ahnell, Woodruff & Edwards. Maintenance Division: George H. Glos, Pettibone Mulliken Corp., "*Responsibilities of the Maintenance Superintendent.*"

1 . . Western Michigan

Finger's Restaurant, Grand Rapids, Mich. E. T. Kindt, Kindt-Collins Co., Cleveland, "*Pattern Engineering.*"

4 . . Saginaw Valley

Fischer's Hotel, Frankenmuth, Mich., Thomas A. Lawton, Buick Motor Div., General Motors Corp.

4 . . Toledo

Toledo Yacht Club, Toledo, Ohio. E. E. Pollard, Caldwell Machine & Foundry Co., Birmingham, Ala., "*Foundry Practice in the Pipe Industry.*"

5 . . Western New York

Hotel Sheraton, Buffalo, N. Y. Guest speaker, J. H. Smith, Central Foundry Div., General Motors Corp., Saginaw, Mich.

8 . . Cincinnati District

Suttmiller's Restaurant, Dayton, Ohio. Ralph A. Clark, Electro Metallurgical Co., Detroit. "*Selection of Melting Materials for Cupola Melting.*"

9 . . Twin City

Covered Wagon, Minneapolis. George T. Boli, Northern Malleable Iron Co., "*The Foundry Needs Engineers.*"

9 . . Mid-South

Memphis, Tenn. Casting Defects Clinic.

9 . . No. Illinois & So. Wisconsin

Beloit Country Club, Beloit, Wis. A. S. Wykorski, Peninsular Grinding Wheel Co., Detroit. "*Casting Cleaning.*" Film "*Play It Safe.*"

11 . . St. Louis

York Hotel St. Louis. Michael Gallo, Great Lakes Carbon Corp., "*Cupola Operation.*"

11 . . Tri-State

Coffeyville, Kan. J. G. Winget. Reda Pump Co., Bartlesville, Okla., "*Melting Gray Iron in Reverberatory Furnaces.*"

12 . . Central New York

Hotel Onondaga, Syracuse, N. Y. J. Thomas Coggin, Elmira Foundry Co. Div., General Electric Co., "*Practical Quality Control.*"

12 . . Birmingham

Jefferson Davis Hotel, Anniston, Ala. Panel discussion: Chairman, Frank H. Coupland, Jr., American Cast Iron Pipe Co. *Sands and Their Uses in the Foundry.*

12 . . Eastern Canada

Mt. Royal Hotel, Montreal, Canada. Past Chairmen's Night. A. E. Cartwright, Crane, Ltd., Montreal, Canada. "*Some Reflections on and Experiences in Melting and Pouring Bronze.*"

12 . . Southern California

Rodger Young Auditorium, Los Angeles. Thomas E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago, "*Pressure Molding.*"

15 . . Quad City

Hans J. Heine, AFS Technical Director, "*The Foundrymen's Most Unused Tool.*"

15 . . Northern California

Shattuck Hotel, Berkeley, Calif. Thomas E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago, "*Pressure Molding.*"

15 . . Quad-City

Hotel Fort Armstrong, Rock Island, Ill, Hans J. Heine, AFS Technical Director, "*The Foundryman's Most Unused Tool.*"

continued on page 90

Chapter Meetings

continued from page 88

17 . . Central Michigan
Daniel E. Krause, Gray Iron Research Institute, *"Cupola Operations and Foundry Coke."*

17 . . Oregon
Thomas E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago, *"Pressure Molding."*

18 . . Washington
Thomas E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago, *"Pressure Molding."*

19 . . British Columbia
Thomas E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago, *"Pressure Molding."*

19 . . Tennessee
Patten Hotel, Chattanooga, Tenn. W. R. Jaeschke, Whiting Corp., Harvey, Ill., *"Cupola Operation."*

19 . . Texas
Hotel Longview, Longview, Texas. Lee Cline, Consolidated Western Steel Div., *"Single Objective Safety Program."*

26 . . Chesapeake
Engineers Club, Baltimore, Md. AFS film *"Effect of Gating on Casting Quality"* and New Jersey Zinc Co. film *"Die Casting."*

December

. . Southern California
Christmas Party

. . British Columbia
Christmas Party

. . Oregon
Christmas Party

3 . . Tri-State
Tulsa, Okla. Christmas Party

4 . . Central Michigan
Annual Christmas Party

6 . . Western Michigan
Bill Stern's, Muskegon, Mich. Hyman Bornstein, *"Practical Metallurgy."*

6 . . Chicago
Chicago Bar Association, Chicago. Round Table Meeting. Gray Iron and Malleable Div. W. W. Levi, Lynchburg Foundry Co., *"Basic Cupola Operation."*

10 . . Northern California
Shattuck Hotel, Berkeley, Calif. Casting Clinic

10 . . Northern California
Christmas Party

11 . . Quad City
Christmas Party

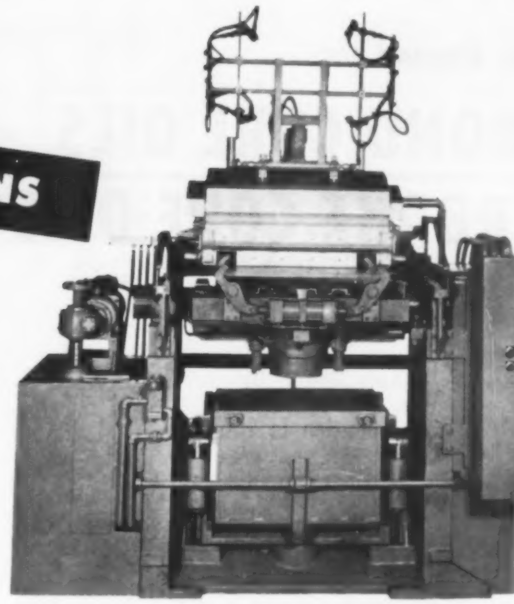
SHORT RUNS

LONG RUNS

In SHELL MOLDING

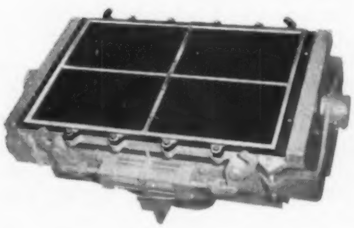
SUTTER

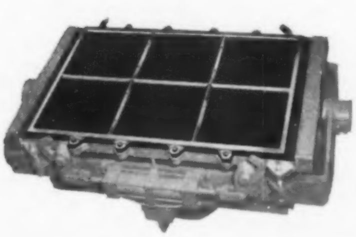
has your answer!



SUTTER SP-1000—20" x 30" shell area
(Also available—SP-1100 with 26" x 41" shell area)

Quick-change mask frames shown here are typical examples of arrangements that are being used successfully in foundries throughout the United States and abroad. Other combinations are available to fit your requirements . . . making short runs possible and profitable.





Long recognized as the outstanding equipment for long run production, Sutter Automatic Shell Molding Machines have also proved to be the answer to short runs in jobbing type work. In fact, many of these versatile machines are used exclusively for short run production.

With these flexible Sutter units, you schedule production to meet your own requirements . . . efficiently and economically. Using Sutter quick-change mask frames, the complete pattern area is utilized. Using patterns with integral stripper pins, pattern costs are kept at rock bottom. Too, interchangeability is quick and easy, reducing downtime to a minimum.

All Sutter Shell Molding Machines provide completely automatic cycle . . . feature high production capacity, adjustable coating and curing times, and uniform fine quality shells. Even unskilled labor can efficiently operate two machines and maintain up to 120 cycles per hour.

Why not investigate the profit-possibilities of Sutter Shell Molding Machines? Find out how you can use these versatile units to fullest advantage in your foundry. Send for complete data and your free illustrated bulletin today.

Exclusive United States Sales Representative:
FREDERIC B. STEVENS, INC.
Detroit 16, Michigan
Branches: Buffalo Cleveland Indianapolis New Haven

Exclusive Canadian and Overseas Manufacturer and Distributor:
FOUNDRY EQUIPMENT LTD.
Leighton Buzzard, Bedfordshire, England

SUTTER **PRODUCTS COMPANY**

Creators of foundry equipment with NEW productivity

2005 WESTWOOD AVE. • DEARBORN, MICHIGAN

For more data, circle No. 684 on postage-free Reader Service card on p. 17 or 18

Alloy Making Unit Placed in Full Scale Operation

An alloy making unit has been built and placed in full-scale operation at the Microcast plant of Austenal Laboratories, Dover, N. J. The recently completed project consists of a 10,000 square foot brick building furnished with the latest alloy producing equipment including casting and shotting facilities. The new building also houses modern, fully-equipped, high-temperature testing and chemical laboratories.

Austenal plans to make the major portion of the alloys needed to supply its production needs.

Two-Wheel Hand Truck Safetygraph Available

"Two-Wheel Hand Trucks," a recent addition to National Safety Council's safetygraph series, outlines the proper maintenance and use of two-wheel hand trucks.

The safetygraph tells how to inspect trucks, proper methods of loading and unloading, how to handle light bulky cartons as well as small heavy boxes, the importance of keeping the load balanced, the use of dock plates and other information.

The new visual aid provides a ready means of training small groups in operation of two-wheel trucks. Consisting of 12 spiral-bound pages 18 x 24 in. inserted in a brown leatherette portfolio, the safetygraph can be set on any flat surface and opened to form an easel.

On the pages facing the audience are clear and accurate drawings showing the proper maintenance and use of two-wheel hand trucks.

Information on prices may be obtained by writing National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

STATEMENT OF OWNERSHIP

Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of AMERICAN FOUNDRYMAN, published monthly at Chicago, Ill., for October 1, 1954. 1—The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill.; Editor, Herbert F. Scobie, Golf & Wolf Roads, Des Plaines, Ill.; Managing Editor, none; Business Manager, William W. Maloney, Golf & Wolf Roads, Des Plaines, Ill. 2—The owner is: American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill., organized not for profit, without stock. Principal officers: President, Frank J. Dost, Sterling Foundry Co., Wellington, Ohio; Vice-President, Bruce L. Simpson, National Engineering Co., Chicago; Secretary-Treasurer and General Manager, William W. Maloney, American Foundrymen's Society, Chicago. 3—The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: none. 4—Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Herbert F. Scobie, editor. Sworn to and subscribed before me this 28th day of September 1954. (Seal). E. R. May, notary public. (My commission expires March 14, 1956.)

Why the Foundry Is A Good Place to Work

At an Industry-Student banquet of the Foundry Educational Foundation at Purdue University, Allen M. Slichter, president, Pelton Steel Castings Co., Milwaukee, was principal speaker. A condensation of his talk in which he reviewed for the engineering students the opportunities that exist in the metal casting industry follows.

■ The foundry industry offers the challenge, the progress, the remuneration and the personal satisfaction necessary to happiness of an individual, Mr. Slichter stated, and gave the following reasons:

1. **It Is a Large Industry.** The 1950 annual survey of the U. S. Census of Manufacturers shows foundry production in value of products exceeded such industries as rubber, furniture, household appliances, radio and TV, and tobacco. During 1951 the estimated value of casting produced was $6 billion represented by 19,251,000 tons of total production.

Because of its size, the foundry industry has ample room in which to move around, and because of its nationwide geographical distribution, it gives a man plenty of opportunity to pick the place in which he would like to live.

2. **The Foundry Industry Has Great Growth Possibilities.** A study of the probable economic picture for 1975 showed an estimated increase of 62 per cent for all forms of ferrous castings. This would give a total tonnage production of some 27,000,000 tons by 1975 as compared with 17,500,000 tons for 1953. Other sources estimate 32,000,000 tons of production by 1975.

The January issue of the AMERICAN FOUNDRYMAN listed these significant developments, among others, that had reached new heights during 1953.

High Pressure Molding . . . D-Process . . . Shell Molding . . . Nodular Iron . . . Foundry Automation and Mechanization . . . Automatic Sand Preparation . . . Dielectric Baking of Cores on Metal Plates . . . Use of Resin Bonded Sand Driers in Dielectric Core Ovens.

Such technological advancements leave no doubt that the foundry industry has a great growth potential.

3. **It Is Lamentably Short In Its Supply of Technical Men.** The foundry industry is an engineering industry and must be run by engineers. It has been undergoing tremendous changes and is rapidly emerging from the days of art into the days of science. Foundry practice is today a science, and to plan, install, maintain and operate the equipment now needed to produce quality castings at competitive prices, requires technically trained men. With the limited supply of engineers in this field, it means that each individual is faced with less personal competition which means more rapid recognition and greater progress.

4. **The Foundry Offers Exceptional Opportunities Because of the Nature of Its Membership.** This is an industry of many small units, 5938 of them in this country and Canada. Only 57 have more than 1,000 employees; only 126 have more than 500 employees, but less than 1,000 people. The balance, 5,755 enterprises, have less than 500 employees—many as few as 20.

With more than 5,700 small units in this vast industry, there exists a greater opportunity to either develop a business or acquire an equity in the company in which the individual is employed. Not everyone will own his own plant. However, the fact exists that the numerous smaller units mean special potentials for fellows who are ready, able, ambitious, and willing to take risks in order that they might, some day, have their own business.

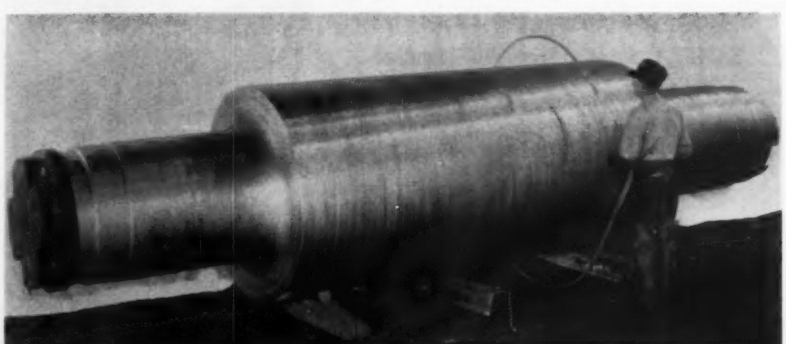
Revitalize Old Foundry

One of Colorado's oldest foundries is being revitalized as a Museum of Science and Industry in the famous mining town of Central City by Roy Higson and Fred Kramer, both of Denver. Mr. Higson owns and operates the Western Foundry in Denver and Mr. Kramer operates Kramer Foundry Supply, Inc., in Denver.

Under the auspices of the Central City Opera Association, the old McFarlane Foundry is being brought to life again after lying dormant for 42 years. As an attraction to tourists the foundry will be operated authentically as it was in the heyday of the mining boom. Iron castings will be produced and a variety of iron souvenirs will be available.

Right, remains of Old McFarlane Foundry

Foundrymen at Manistee Iron Works, Manistee, Mich., lower upper part of mold used for seven-ton cast frame of gear cutting machine now in production.



Giant backup roll, cast, machined and annealed by Continental Foundry & Machine Co., East Chicago, Ind., at one of its plants in Wheeling, W. Va., is the largest in diameter ever made for use in a four-high steel rolling mill, it is claimed. Roll measures 60 in. in diameter and weighs 147,000 lb as pictured above, after machining.

GOOD MORNING BOSS

I made a mold just yesterday; it was a pretty job.
I patched it up and sliced it and washed it with a swab.
I lit the torch—the whistle blew before I got it dry.
That evening when they poured my mold, it popped and blew sky high.

Good morning, Boss! Why are you frowning so?
Why, howdy, Boss! I'll bet a buck I know.
It's about that job that blowed last night; I can explain. You see
The night men must have got it wet; I'm sure it wasn't me.

The sand man, mixing core sand in the mill just yesterday,
Was stricken with a mental lapse, forgot to add the clay.
Coremakers tried to work that sand, and baby, how they cussed!
And when it felt the oven's heat it crumbled into dust.

Good morning, Boss! Why do you look so sad?
Good morning, Boss; it surely ain't that bad!
About those cores that burnt up—I think I have the key—
The oven must have been too hot. Don't blame it on to me.

A grinder ground a casting, and made his own decision.
Took off too much and ground too deep and spoiled the planned precision.
Next morning when the guy returned from breakfast and his nap,
He found they'd took his casting and chucked it in the scrap.

Good morning, Boss! Ya think it's gonna rain?
Nice morning, Boss! Whatsa matter? You in pain?
That casting that you scrapped last night—I know it wasn't mine.
If you'da give that job to me, it woulda come out fine.

Old Charlie is a bumper man, some say he is the best.
Stayed up too late the other night and didn't get his rest.
Then on the job he went to sleep, and between his gapes and snores,
He made a mold and closed it without putting in the cores.

Good morning, Boss! How ya doin'? Whadda you say?
Good morning, Boss! Nice weather for ducks. Heh, Heh!
That mold you poured without the cores—that's bad as bad can be.
My helper must have closed it. I know it wasn't me.

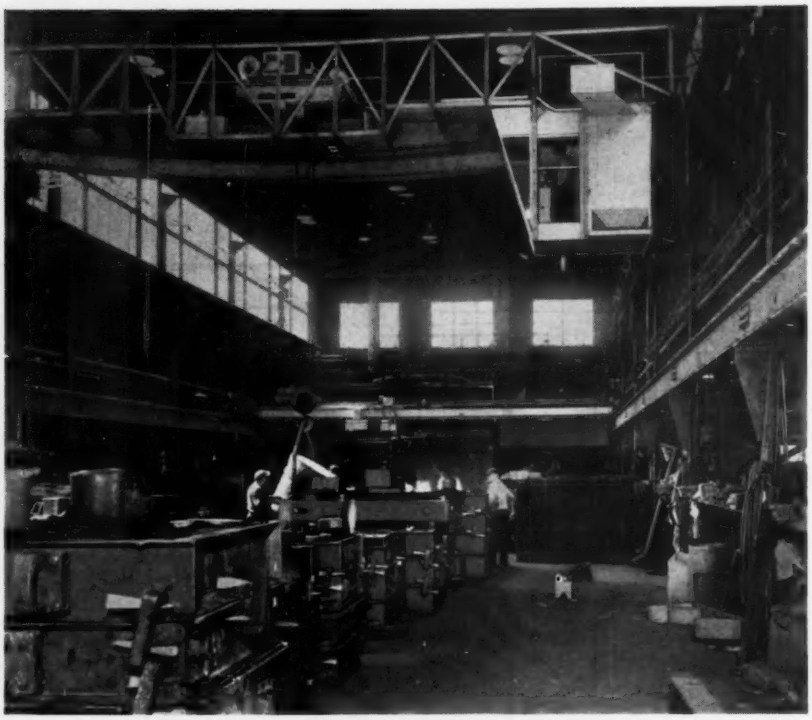
The boss is wise to all these guys, he knows them inside out.
He knows just where to place the blame, no matter how they shout.
And try to pass the well known buck, for he's a smart old head.
But if you talked to him like this, I'll bet he would drop dead:

Good morning, Boss! I'll bet you're sore today.
Good morning, Boss! You ought to dock my pay.
That casting that we lost last night was all my fault, you see.
So don't bawl out the other guys, just blame it on to me.

From *Rammed Up and Poured,* book of foundry poems by Bill Walkins, obtainable from the copyright owners: Electric Steel Foundry Co., 2141 North West 25th Ave., Portland 10, Oregon. Price, $1.85.

Advertisers and their Agencies

Don't let heat, dust, dirt and fumes hamper your foundry operations!



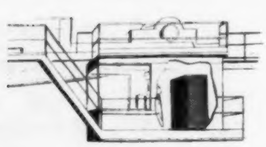
Increase productivity and efficiency with DRAVO AIR CONDITIONING EQUIPMENT!

Excessive heat, dirt, dust and fumes are costly in any man's foundry. Especially in overhead areas where unhealthy conditions make it difficult for crane operators to keep alert during operations. The results: lower efficiency and slower production.

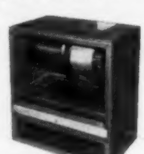
If these conditions are plaguing your foundry operations, you can quickly and easily eliminate them by installing Dravo Air Conditioning Units on your overhead cranes. Dravo Conditioners will provide reliable year-around ventilation, heating and cooling with a continuous supply of clean air. The results: top efficiency and faster production.

Dravo Air Conditioning Units are built specifically for rough, tough industrial usage. Each unit is a self-contained package and can be installed with a minimum of crane downtime. Why not check their features now and then get complete information at the nearest Dravo sales office? Or write to Dravo Corporation, Fifth and Liberty Avenues, Pittsburgh 22, Penna. Ask for Bulletin No. 1301.

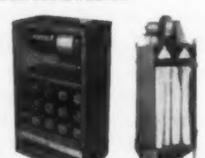
ONLY DRAVO OFFERS A COMPLETE LINE OF CRANE CAB CONDITIONERS



Crane Cab Conditioners . . . for cranes working over foundry "hot spots." Maintain temperatures of 80-85 F in summer and 68-72 F in winter, eliminate excessive heat, dust, dirt and fumes.



Heating and ventilating units . . . designed to filter dust and dirt from atmosphere in crane cabs and provide constant ventilation and wintertime heat. Tempering controls are automatic.



Heating and filtering units . . . designed for conditions which require fume removal. Provide constant ventilation and wintertime heat, eliminate dust and dirt from atmosphere. Tempering controls are automatic.

DRAVO
CORPORATION
PITTSBURGH, PENNA.
Sales Representatives in Principal Cities

For more data, circle No. 665 on postage-free Reader Service card, p. 17 or 18

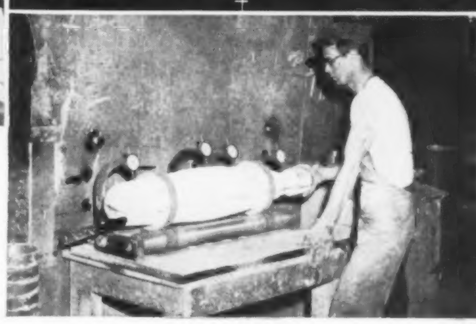
WHERE ACCURACY COUNTS...

LINOIL

SCORES A DIRECT HIT!

Core assembly is shown in stages from front to rear. Stacked body cores are secured by steel rods. Barrel cores are inserted after first five body cores have been assembled.

49 inch shell has maximum diameter of 11 inches. 1500 pounds of metal is poured into each mold to obtain a finished casting weighing 600 lbs. High precision cored cavity is shown at right.



Barrel cores are made of halves pasted together . . . then tested for concentricity tolerance of $\pm$.025.

Molds, when assembled are 84 inches high. Pouring requires catwalks and special clothing for safety.

UNIQUE CAST ARTILLERY SHELLS ARE HELD TO CRITICAL DIMENSIONS AT

AUTO SPECIALTIES MFG. CO.

(RIVERSIDE CRANKSHAFT DIV.)

ST. JOSEPH, MICHIGAN

Aberdeen Proving Grounds, after testing cast artillery shells, concluded that no other means of shell manufacture had been proven to an equal degree of accuracy...5 rounds within a 29-yard square at 23,000 yards range.

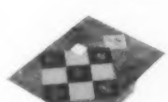
The Riverside Crankshaft Division of Auto Specialties Mfg. Co. has proven the extreme accuracy of cast shells beyond a doubt.

The 280 mm. shell illustrated is a core job inside and out . . . from start to finish. Molds are made up of baked cores stacked 18 high while the cavity is formed by a barrel core held to the exacting concentricity of $\pm$.025 inches.

In cases like this, where the precision of the work is dependent upon the cores . . . and core accuracy is the prime target, LINOIL scores a direct hit! . . . as proven by Auto Specialties. Every batch of mix, whether for barrel, body or gating cores, uses rigidly controlled volumes of LINOIL. The uniformity of LINOIL eliminates the need for varying mixtures and plays a vital role in quality control.

Your LINOIL man will help you select specific-purpose core oils to answer your problems. Call him today, or write to ADM at the address below.

AVAILABLE TO FOUNDRIES... Continuous Technical Information Service on the latest developments from the ADM Sand Laboratory...furnished in handy file-folder form for quick reference. A request on your letterhead will put your name on our permanent Technical Information mailing list.



LINOIL — A-D-M-PROCESS OILS — FREFLO — LINOCEL — INDUCTOL — ADMIREZ

"ZERO IN" ON THE COMPLETE LINE OF **ADM** QUALITY FOUNDRY PRODUCTS

ARCHER • DANIELS • MIDLAND COMPANY

2191 W. 110th ST. • CLEVELAND 2, OHIO

FOUNDRY PRODUCTS DIVISION